plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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Thickness Measurements on Platings by Means of an Electron Probe

Evaluation of Modern Methods of Improving the Corrosion Resistance of Plated Zinc Base Die Castings

The Development of Duplex Nickel Plating Process

Data on the Corrosion Resistance of Electroplated Zinc Die Castings

Report of AES 7th Interim Meeting

AES 1960 Annual Convention (Los Angeles) Program

PLATING MAGAZINE

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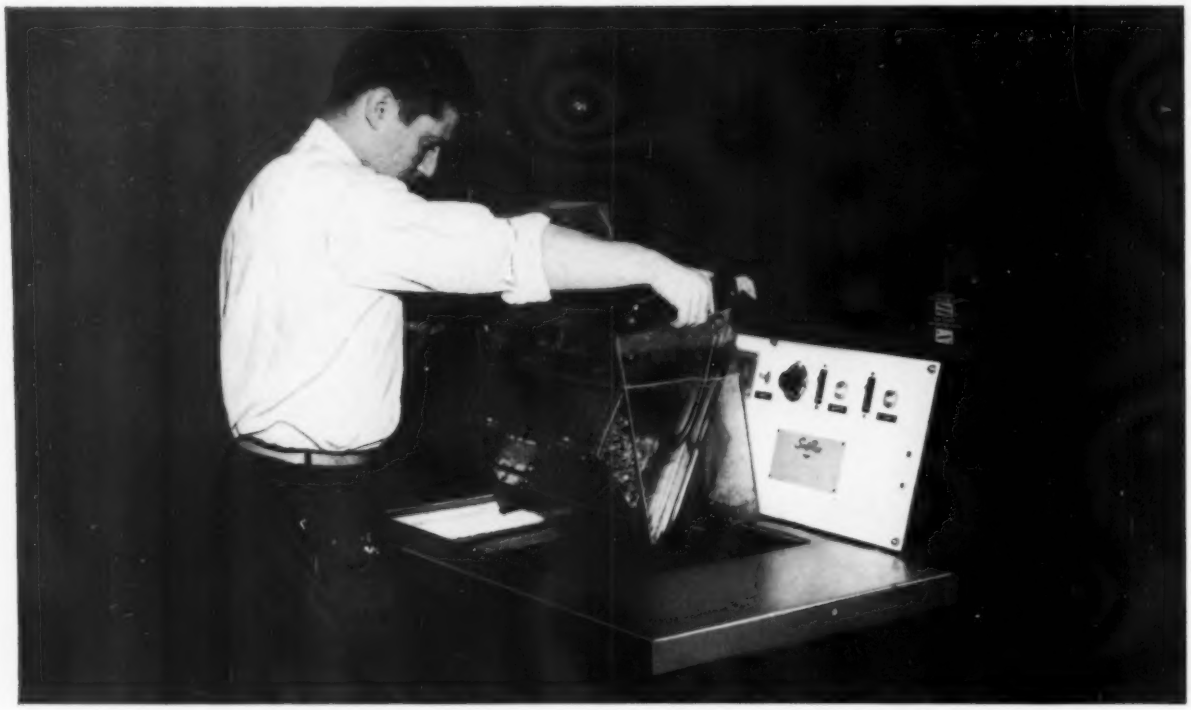
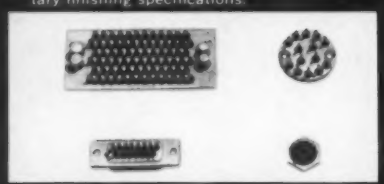


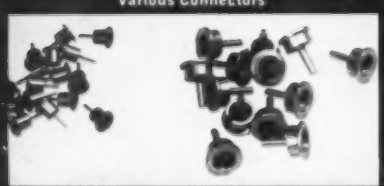
One of 3 Sel-Rex Platers in which Glass-Tite "barrel-plates" over 1-million components a week with Autronex Acid Gold.

Glass-Tite Industries Improves Transistor-Headers' Reliability with Autronex* Acid Gold Electroplate

In business only 3 years, Glass-Tite is already one of the three top producers of glass-to-metal, hermetically-sealed transistor products in the country. Their products meet or surpass, all applicable military finishing specifications.



Various Connectors



Diode Bases

Transistor Bases

These quality Autronex Gold Plated transistor products will be on display at the IRE Show Mar. 21-24, N. Y. Coliseum, Glass-Tite Industries booth #1109.

Wrap transistor-header lead wires around a 40-thousandth mandrel—subject the headers to a scorching 400°C—dip them in a highly concentrated solution of hydrofluoric, nitric and acetic acids (CP-4) and you have some idea of what Autronex Acid Gold Electroplate withstands at Glass-Tite Industries, Inc. Providence, Rhode Island. Actually, all these "tests" are functional. The transistor headers will be subjected to similar conditions by military and industrial end-users while becoming critical com-components in complex electronic equipment.

According to Mr. John Newman, Chief Chemical Engineer at Glass-Tite, the Autronex Acid Gold Electroplating Process was installed because it demonstrated dramatic superiority over other materials. On one occasion, Mr. Newman relates, Autronex Gold Plated Transistor-Headers were left in the CP-4 etch solution *overnight*—"... just to see what would happen." By morning, the glass seals had dissolved, the Autronex Gold Electroplate had not been affected.

The famous glass-to-metal, hermetically sealed transistor bases produced by Glass-Tite Industries, end up in multi-million dollar, missiles, rockets, and computers. In applications like these, only the best is good enough. That's why Glass-Tite and leading electronic component manufacturers the world-over specify Autronex Gold Electroplate.

Sel-Rex are the largest selling Frecious Metal Electroplating Processes in the world. Free technical literature on request—specify application.

*Trade mark for Sel-Rex patented Acid Gold Plating Process

Exclusive Precious Metal Electroplating Processes

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Get all the facts right now about economical, cold paint stripping by calling your Enthone representative for a demonstration of Stripper S-26. Or write to Enthone, Inc., 442 Elm Street, New Haven, Connecticut, for complete literature.

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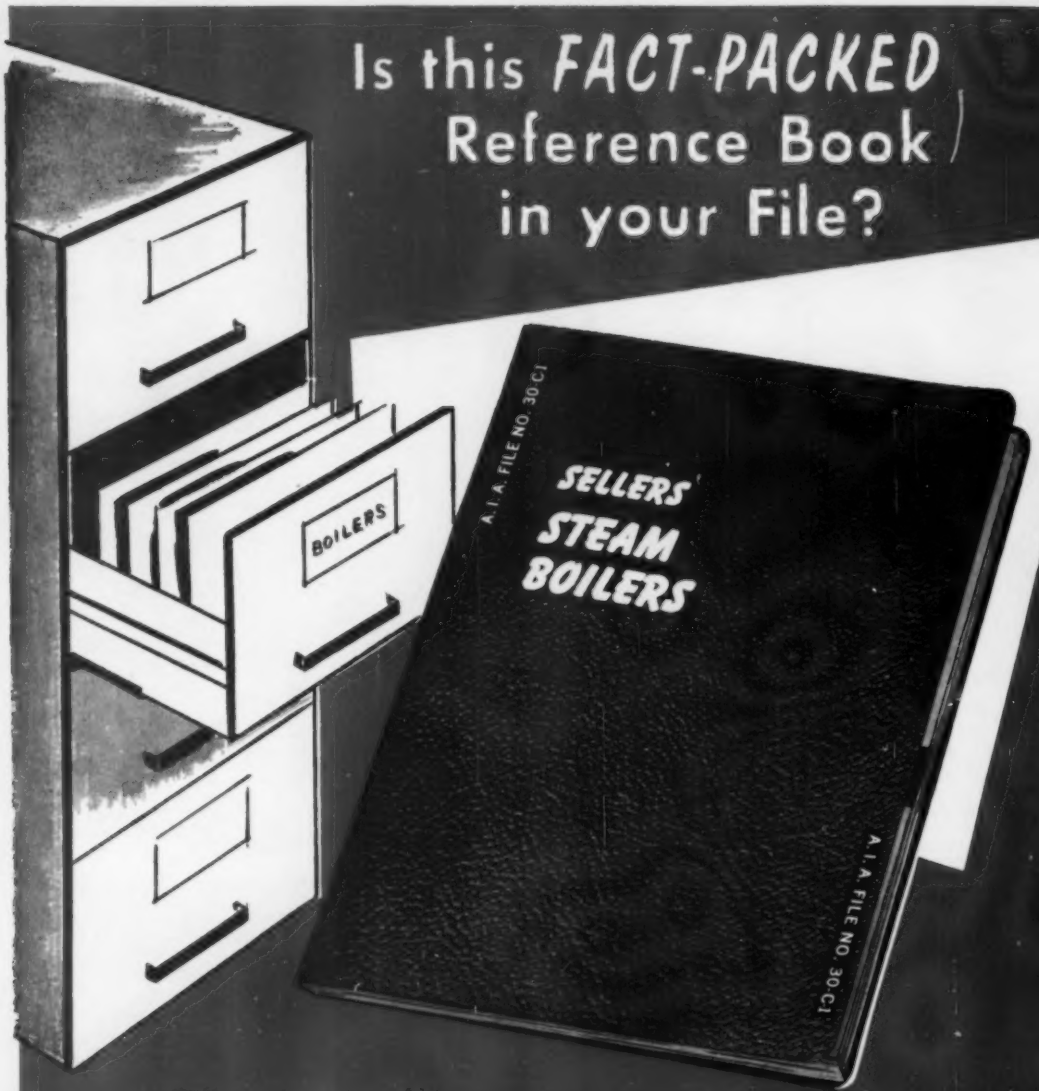

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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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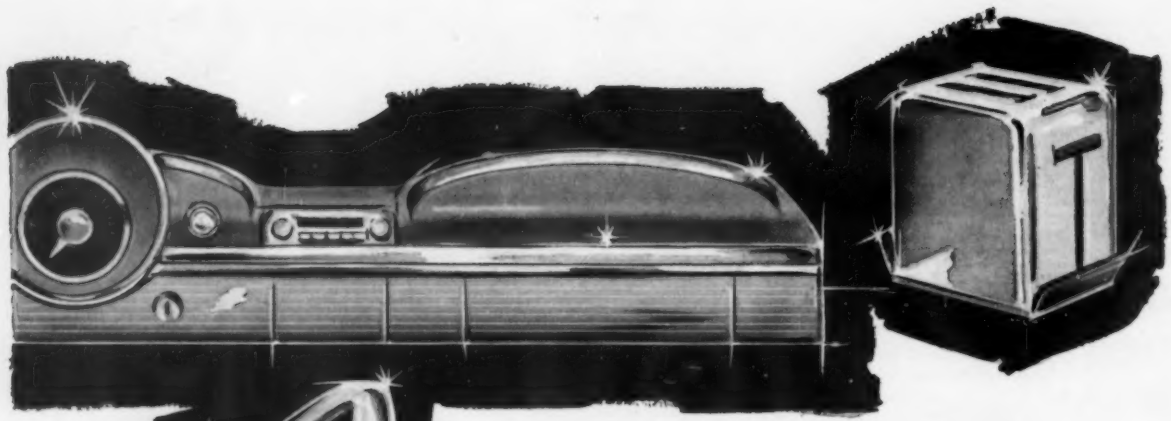

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EDITORIAL

HELP WANTED

BRANCH COMMITTEE MEMBERS WANTED—Excellent opportunity to help your AES Branch to grow. No experience necessary. Just willingness to serve. Contact your AES Branch President for 1960–1961 appointments.

SOON IN MANY American Electroplaters' Society Branches, the incoming President will have the honor and duty to make appointments to various Branch Committees. His selection will largely depend upon those members who have volunteered their services. Failing to have enough names, he will usually reappoint past committee members.

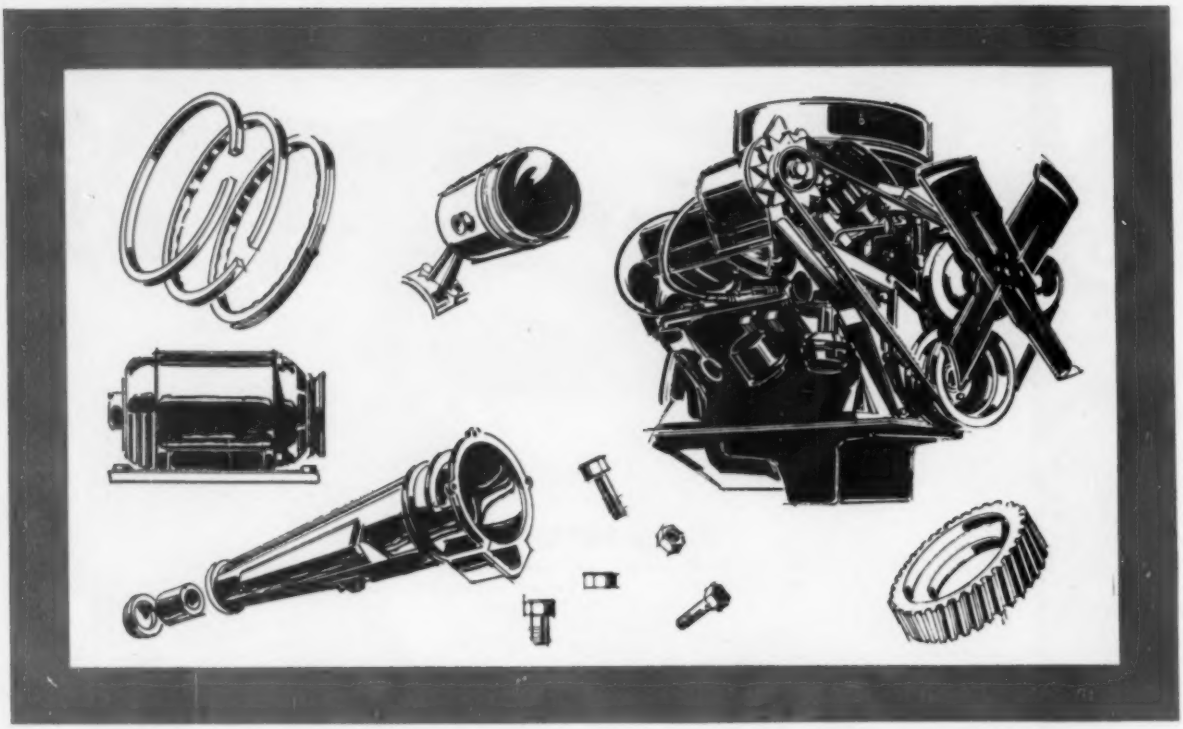
With as much talent as is available in most Branches, the latter practice not only narrows the stature of participation in Branch operational affairs but also limits the development of Branch leaders through service. Branch Presidents desire to avoid these limitations but have no alternative if volunteers fail to step forward.

It is the obligation of each member of the American Electroplaters' Society to participate actively in Branch management and operation for the betterment of the Society and the Branch. The rewards of participation are numerous. They include fellowship, committee experience, leadership training, and personal satisfaction.

Your Branch President will appreciate hearing from you. You gave him your vote. Now give him your active support by submitting your name for a committee appointment.

Manuel Ben

Third Vice President
American Electroplaters' Society



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1. An internationally reputed monthly publication enjoying the largest audited paid circulation in its field.
2. Readership constancy substantiated by the highest paid subscription renewal percentage in this field.
3. Lowest advertising rates for reaching the foregoing market.
4. Reader's Service Card assistance to advertisers in seeking readers' response to their advertising.
5. Mailing service available at nominal cost to its regular advertisers thereby enabling them to link direct mail promotion with their magazine advertising.

PLATING MAGAZINE is a member of Audit Bureau of Circulation (ABC). Its circulation is audited by experienced ABC circulation auditors. The facts thus obtained are issued in ABC reports which show how much circulation PLATING has—how it was obtained—where it was distributed—and other information that tells businessmen what they get for their advertising investment in PLATING MAGAZINE'S advertising columns.

Ask to see a copy of our latest available ABC report. Ask, too, for our free booklet, "Market Data and Media File."

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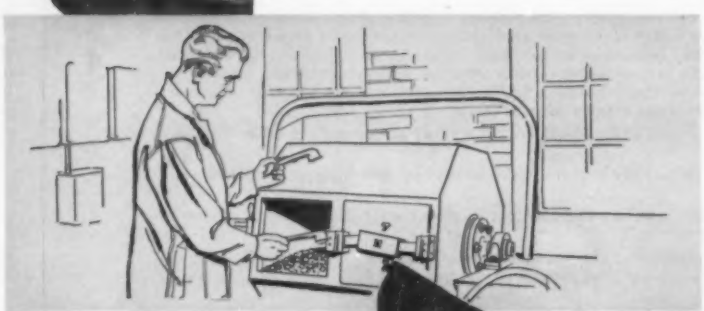

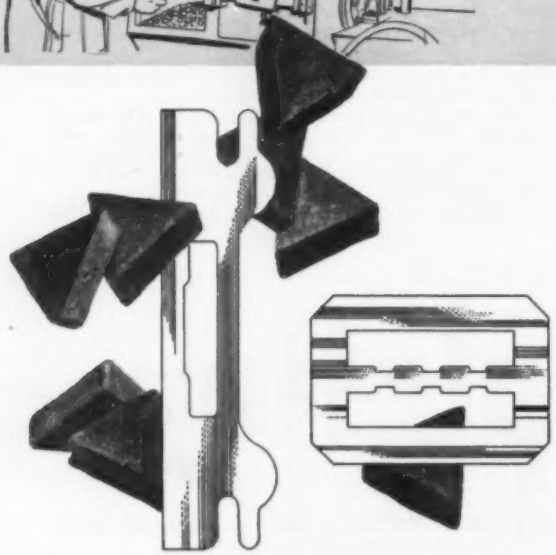

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Cut this cost to very lowest by choosing the right Norton TUMBLEX *abrasive . . . available in five types and many sizes . . . engineered for best results covering the range of barrel finishing.*

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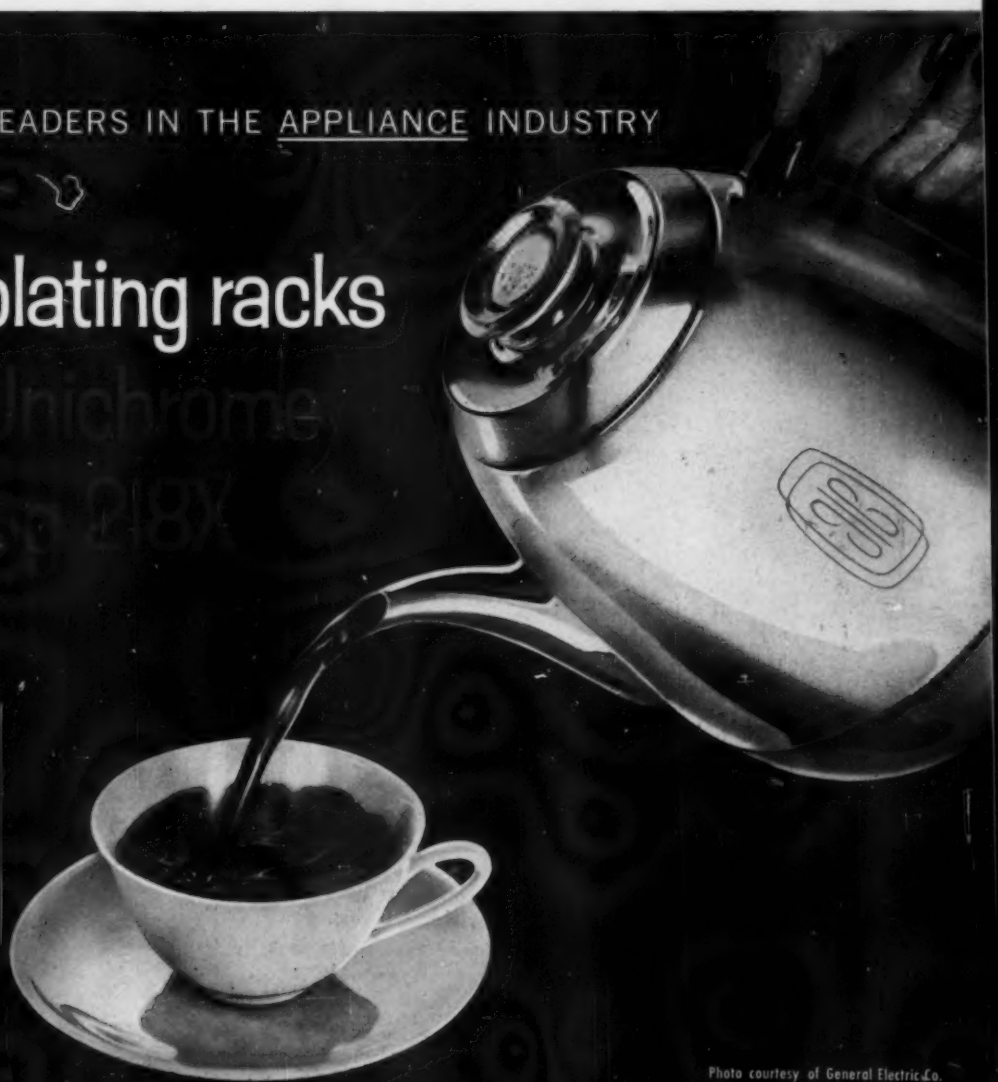

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Positive 6-Point Connections. Self-cleaning heavy duty contacts need little or no attention.

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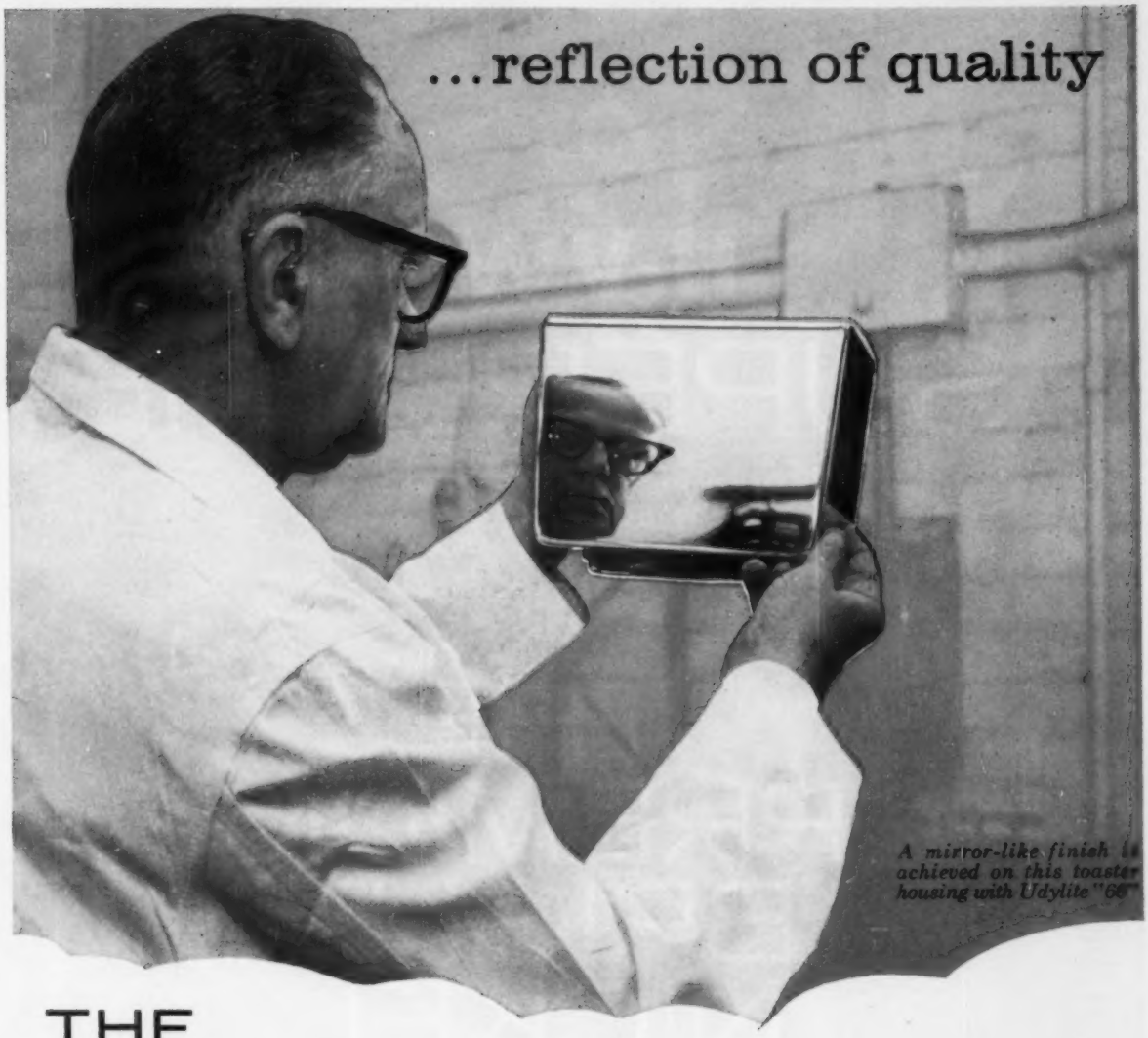

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There may be other baths as bright as H-VW-M Superlume

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Lucite — Hard Rubber or Bakelite Cylinders
Motor — Geared in Head
Minimum Maintenance

* * *

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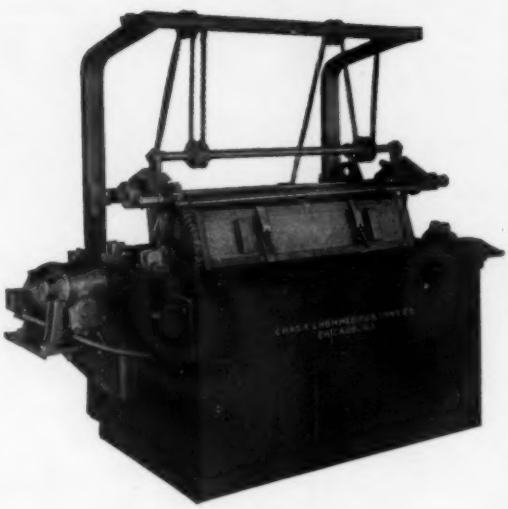

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High power factor and low ripple.

6 to 48 volts D.C.

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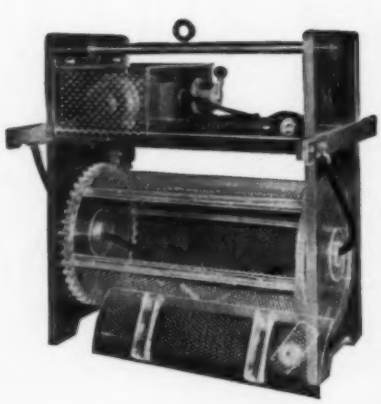

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Built of extra heavy High Temperature Lucite for volume production and stability.

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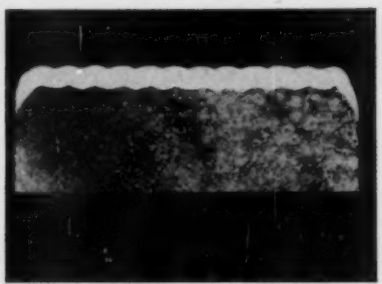
Photo shows the Perfect Circle "200" chrome top compression ring (L) and "98" self expanding oil ring (R). The face of the compression ring and the steel rails of the oil ring are plated with solid chrome .004"-007" thick.



Sectional photomicrograph of the "200" compression ring shows interrupted surface and thick plating of chrome.

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Perfection is the goal in producing piston rings. Each is machine tooled to exacting specifications and the chrome plating must be flawless. To safeguard against plating difficulties . . . and expensive rejects . . . Perfect Circle Corporation relies on Mutual Chromic Acid. Like many experienced platers, Perfect Circle knows that careful control, plating skill plus Mutual Chromic Acid add up to a top quality chrome finish.

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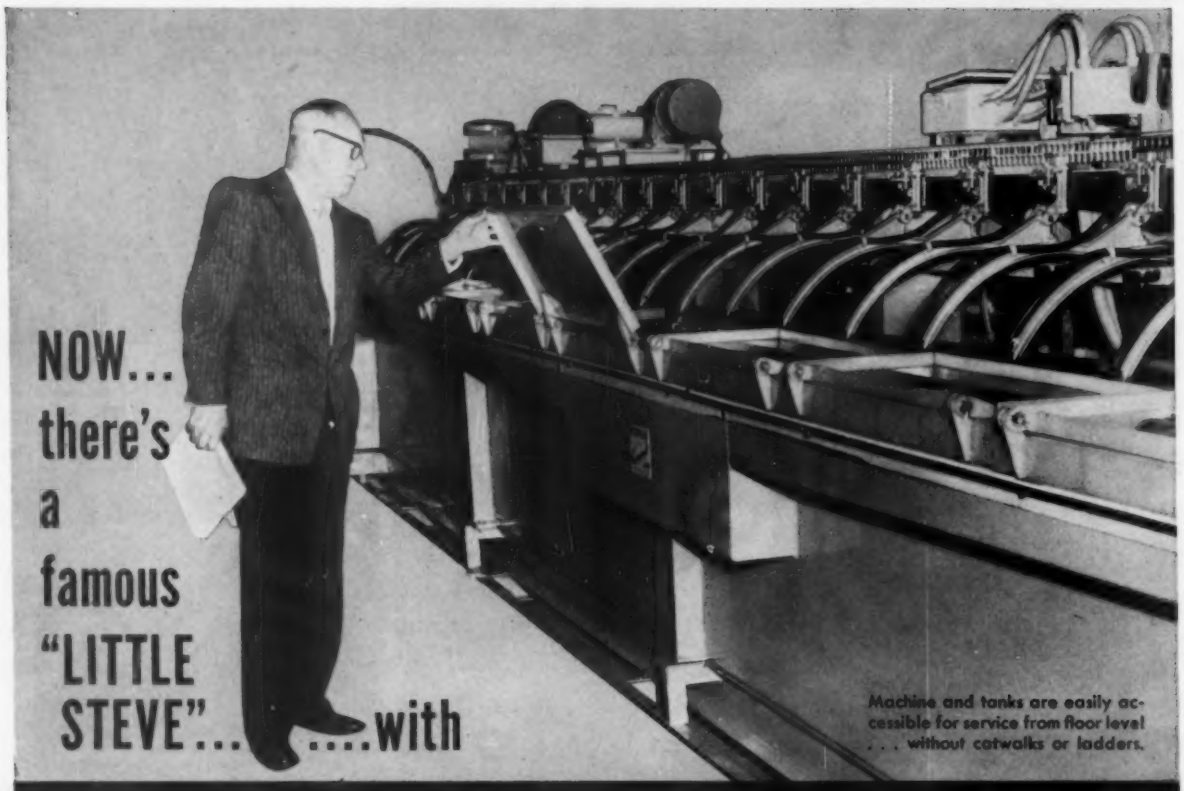

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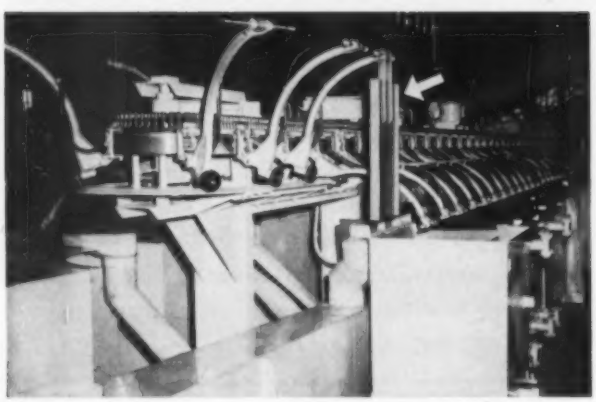

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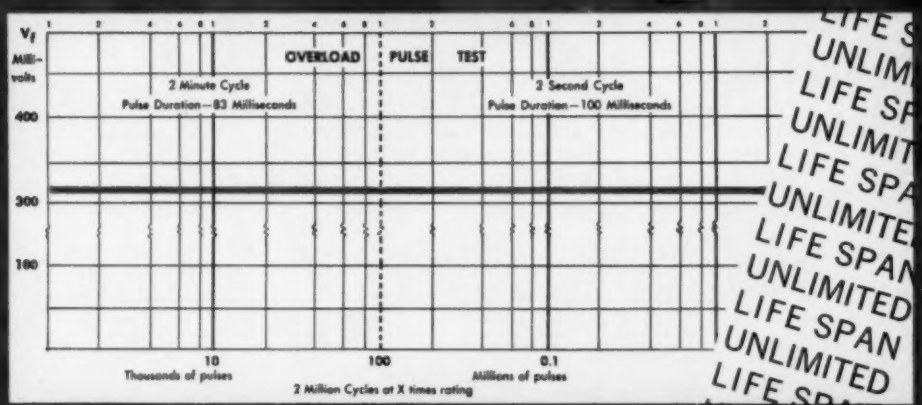

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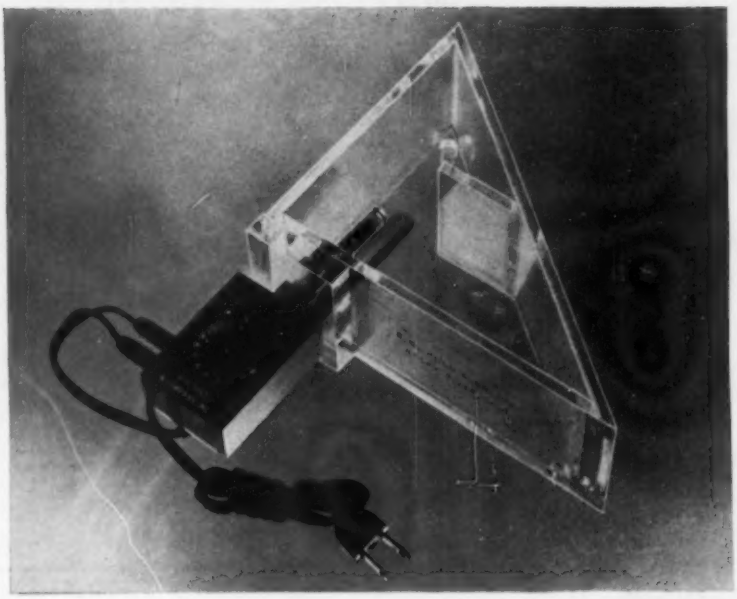

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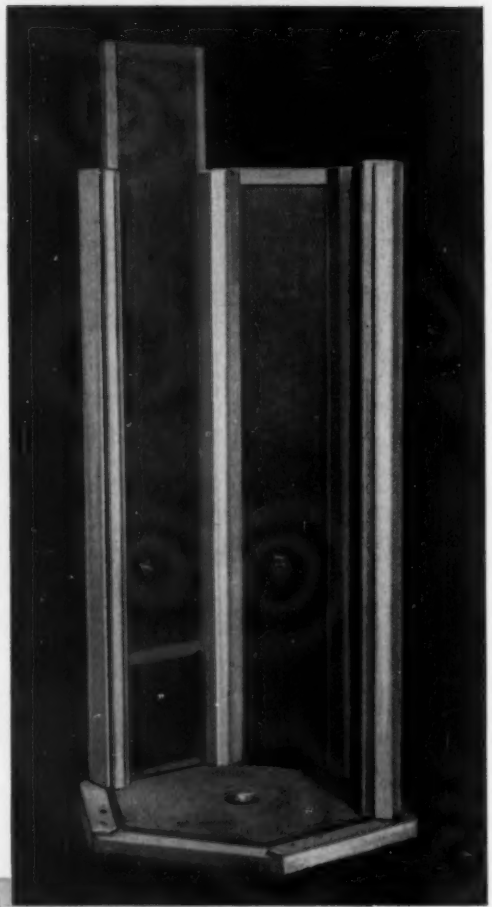

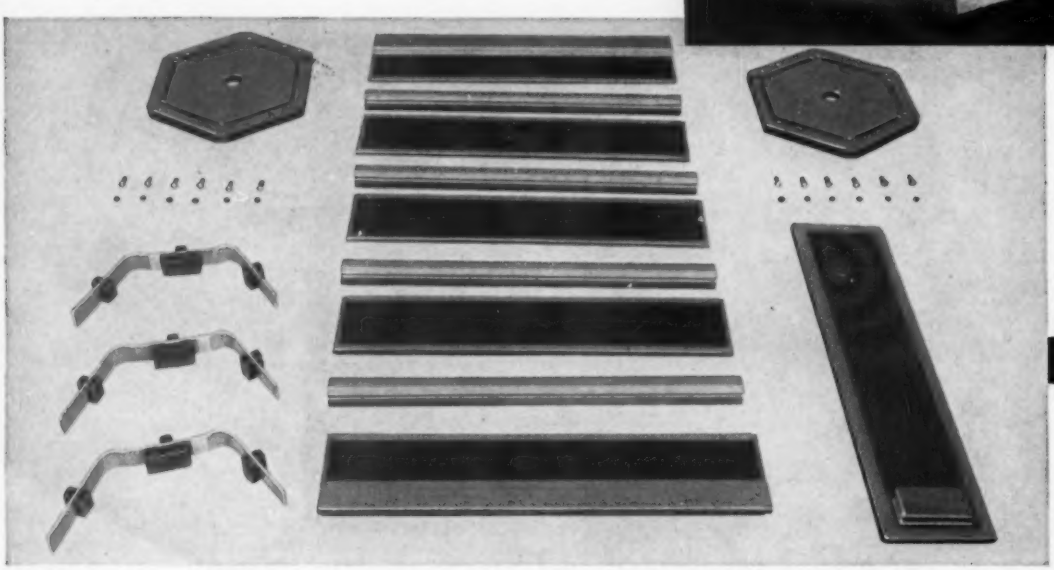

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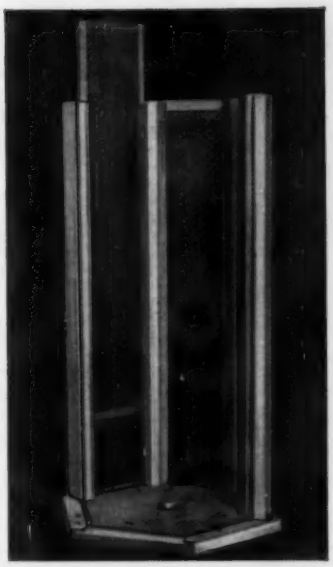

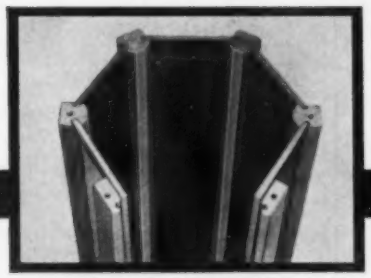

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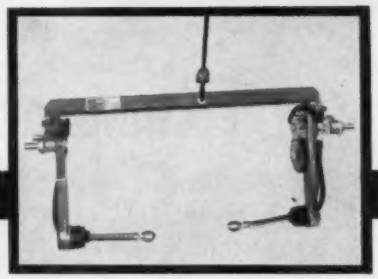

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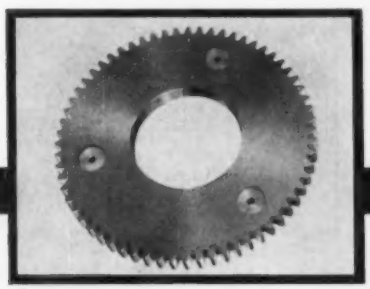

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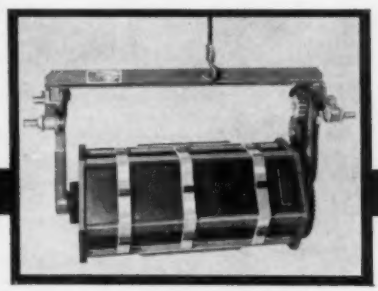

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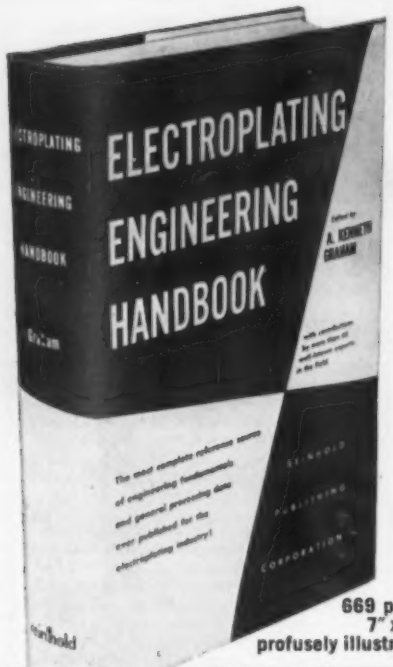
(1) Chairman Walter L. Pinner extending official welcome. Dr. William Blum, AES Scientific Award winner, seated. (2) Crowded auditorium at the first session. (3) Session Chairman T. P. Hoar introducing Dr. Blum, who delivered the first William Blum Lecture.



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THICKNESS MEASUREMENTS ON PLATINGS BY MEANS OF AN ELECTRON PROBE*

by RUDOLPH KRIEGLER and BERTHOLD W. SCHUMACHER**

ABSTRACT

Exploratory experiments on thickness measurements of metal platings by means of an electron probe have been carried out making use of the energy-range relation of electrons. An electron beam of variable energy is directed into the sample; the energy at which the electrons penetrate the plating and reach the base metal is obtained by measuring the acceleration voltage of the electron beam at the appearance of characteristic X-ray lines from the base. The use of an atmospheric electron probe with an X-ray spectrometer makes the measurement feasible for rapid industrial routine tests.

Nickel plated iron and chromium plated nickel samples were used for the experiments with 0.05 to 0.40 mil and 0.05 to 0.20 mil plating thicknesses respectively. The energy of the electron probe was variable between 20 and 50 kev. The experimental results came very close to the calculated values. By current and high-voltage stabilization, not used so far, the accuracy of measurements would surpass most of the existing non-destructive methods. In contrast to others the applicability of the electron probe method is not restricted to any special combination of plating and base material; it is versatile and can cover the range from the thinnest uniform layer up to the centimeter thickness.

INTRODUCTION

THE POSSIBILITY OF MEASURING the thickness of metal platings by means of an electron probe has been studied at the Ontario Research Foundation making use of the well-known energy-range relation of electrons. An electron beam of variable energy is directed into the sample. The energy at which the electrons penetrate the plating and reach the base metal is determined by measuring the acceleration voltage of the electron beam at which the characteristic X-ray lines from the base begin to appear.

In contrast to other methods, application of the electron probe is not restricted to any special combination of plating and base material; its great advantage over the X-ray fluorescence method is the increased speed and the possibility of measurements on a microspot.

EXPERIMENTAL PROCEDURE

The experiments were carried out with an atmospheric electron probe and X-ray spectrometer† built at the O.R.F. mainly for spectrochemical analysis. Fig. 1 shows the experimental arrangement. The incident electron beam strikes the sample at 45°, while the generated X-rays are measured perpendicular to the surface.

The target spot observed by the spectrometer has a constant diameter of approximately 0.2 mm; the beam itself is distributed over a somewhat larger area depending upon the voltage, since scattering of the electron beam both in the small air gap and in the sample is a function of its energy. The excitation probability of X-rays is also dependent on voltage. It is therefore advisable, though not absolutely necessary, to record intensity ratios of base line to line from plating against voltage, rather than the intensity of the base line only. Moreover, measurement of intensity ratios is better when X-ray radiation from the plating excites fluorescence in the base metal. In this case the base will always have a finite intensity; therefore, instead of measuring the voltage where the base line starts to appear, one registers the point where the intensity ratio, due to penetration and direct excitation, starts to increase. For routine analysis it would be practical and quite feasible to employ a double spectrometer or non-dispersive analysis. The muzzle of the electron gun may be conical in order to reach into concave shapes.

Intensity ratios of FeKα and NiKα X-ray radiation were measured on nickel-plated iron samples of nominal plating thicknesses of 0.05, 0.10, 0.15 and 0.40 mils (1.3, 2.5, 3.8 and 10.0×10^{-3} mm) respectively. Thickness was calculated from the plating time and current assuming constant current density under the best conditions our electroplating laboratory could supply.‡ The platings showed no holes under a microscope. Each of these specimens was irradiated in turn by our electron gun with electron energy varied between 20 and 50 kev, using a beam current of 30 μa at each voltage. The spectrometer was set at the NiKα and FeKα lines respectively, and the time for a predetermined number of counts from a Geiger-counter was measured. The results are

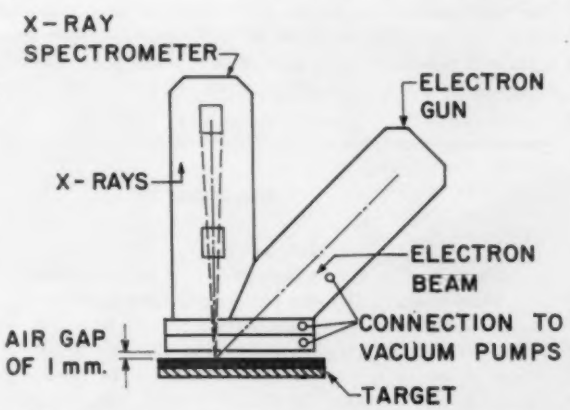


Fig. 1. Arrangement for measuring plating thickness with electron probe. Specimen is in air and may have any size. No physical contact between specimen and apparatus.

*This work was financed from the endowment income of the Ontario Research Foundation.

**Ontario Research Foundation, Toronto 5, Ontario, Canada.

†For the atmospheric electron probe see: B. W. Schumacher, Optik **10** (1953) 116. For details on probe and spectrometer, the O.R.F. Phys. Research Reports 5902 and 5904 are obtainable from the Foundation. O.R.F. can build the complete instrumentation for thickness-gaging.

‡The precision of this calculation is, of course, rather limited. Therefore the nominal thickness referred to later is not an absolute measure for judgment of the accuracy of the electron probe method. To decide upon the final accuracy, however, was not our intention at the present stage of investigation. We are indebted to Mr. J. Saiddington for the care with which he prepared the platings.

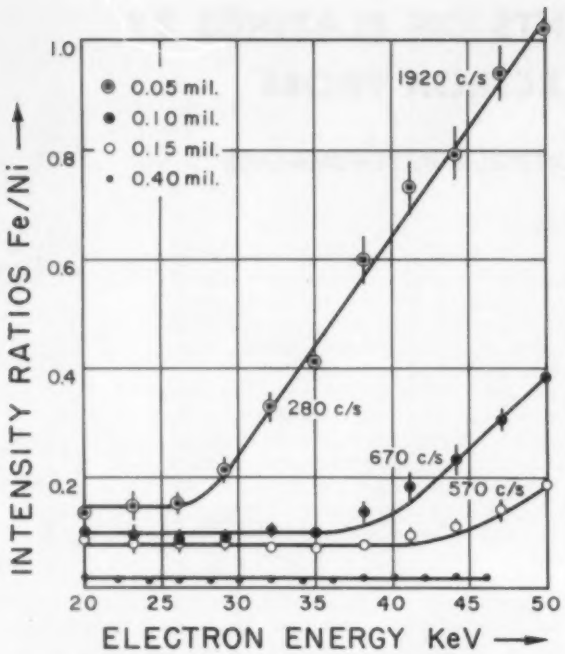


Fig. 2. Intensity ratios of FeKα and NiKα X-ray lines from nickel-plated iron, plotted against electron excitation energy at different plating thicknesses. Some absolute count rates for Fe are indicated.

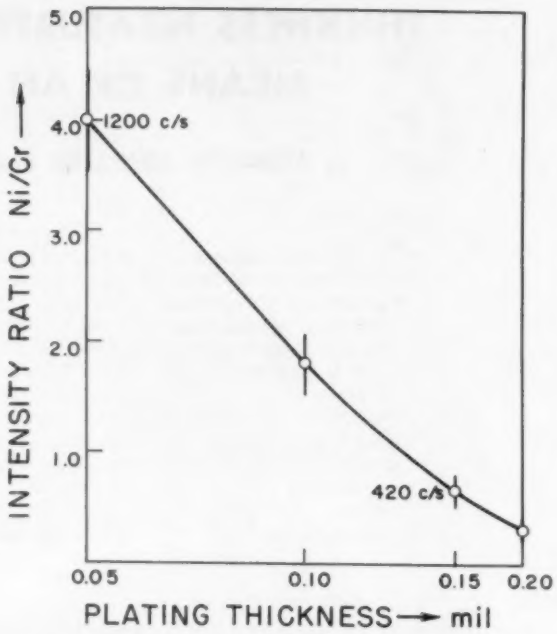


Fig. 3. Thickness measurement with constant electron energy. Intensity ratio of NiKα and CrKα X-ray lines from chromium-plated nickel samples plotted against plating thickness. Electron energy 45 kev. The absolute count rates indicated refer to Ni intensities.

shown in Fig. 2. The probable limits of error represent the estimated reproducibility of successive measurements under our experimental conditions, i.e. without any current or high-voltage stabilization. These conditions can be improved considerably in the future.

RESULTS, DISCUSSION

At a certain point in each of the intensity ratio curves, I_{Fe}/I_{Ni}, except for the 0.4 mil nickel plating thickness, the ratio shows a sudden increase. This "breaking point" on the curves shifts to higher voltages with increasing plating thickness; for the 0.4 mil curve it can be regarded as being above 47 kv. The voltage of the point where the sudden change occurs has physical significance; it shows where penetration of the nickel plating and direct excitation of the iron base begins, and it is not dependent on instrument performance. The table gives a comparison of the expected and measured values, taking into account the 45° inclination of the electron beam with respect to the sample surface, and the fact that the energy of 6.4 kev is necessary to excite the FeKα lines.

For an energy less than that necessary to penetrate the plating, X-rays may or may not be generated in the base metal, depending upon whether the X-rays from the plating can or can not excite them. Nickel X-rays can excite the iron. Since the fluorescence radiation in the iron is proportional to the primary nickel radiation, for a given thickness the ratio of intensities I_{Fe}/I_{Ni} is constant. On the other hand the absorption is less in a thinner nickel layer; therefore the initial ratio I_{Fe}/I_{Ni} is higher for thinner platings as Fig. 2 shows clearly.

Apart from the method described so far, plating thickness can be measured in a less systematic but faster way without determining the voltage where direct excitation of the base metal begins. The curves show that intensity ratios for different plating thicknesses differ sufficiently to be used for thickness determinations at any particular voltage. The higher the voltage is above the minimum voltage required for direct excitation of the base, the more sensitive is the method. Now, however, instrument performance must be kept constant, and the chemical composition of the base must be

Calculated Values				Measured Values	
Nominal thickness, mils	Thickness to be penetrated by the electron beam, mils	Energy* required for penetration, kev	Energy for excitation of the base line, kev	Voltage at breaking point of intensity ratio curve, kv	Measured thickness, mils
0.05	0.071	20.0	26.4	27	0.05
0.10	0.141	30.5	36.9	37	0.10
0.15	0.212	40.0	46.4	43	0.135

*Values taken from Rev. Mod. Phys. **24** (1952) 28.

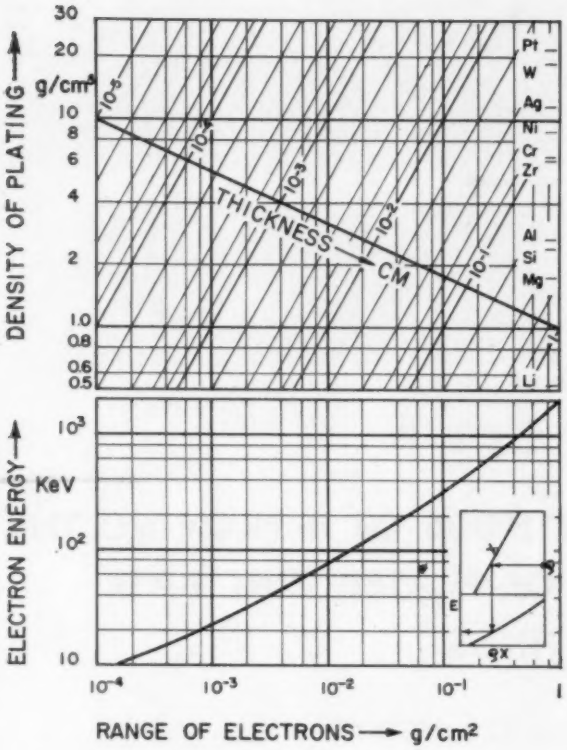


Fig. 4. Nomogram to calculate the electron energy necessary for thickness gaging with an electron probe. Energy required to excite base material is not included.

uniform. This was not required before, but one gains higher count rates and, hence, testing speed.

Using an electron beam having an energy of 45 kev, intensity ratios of NiKα and CrKα lines from chromium-plated nickel samples were obtained. These values, when plotted against a logarithmic thickness scale (Fig. 3), result in a nearly straight line over a wide range of thicknesses; that is, as long as the intensity ratios are measured with constant accuracy, the relative accuracy of the thickness measurements remains fairly constant.

POSSIBLE APPLICATIONS

The minimum energy of the electron probe required to measure a given plating thickness of any material can be obtained from Fig. 4. It can be seen that thickness measurements become feasible up to the centimeter range. The necessary electron energy, up to 3 Mev, for such measurements can readily be obtained, e.g. from a Van de Graaf generator. Isotope electron sources may be used in some cases; the general disadvantage is, however, that they do not have mono-energetic electrons; besides, their beams are very weak compared to the current values obtainable from electron guns.

There is no lower limit to the thickness range that can be measured, especially using the second method as explained above and shown in Fig. 3. Since the smallest detectable amount of an element is in the order of 10^{-10} g, one can foresee measurements carried out even down to the point where uniform layers cease to exist.

Other existing non-destructive methods for measuring thickness of platings all depend on differences between certain physical characteristics of the backing and overlay material. These differences must be sometimes very large if the measurements are to be accurate. This fact limits the applicability of these other methods to special combinations of base and plating material. The X-ray fluorescence method approaches most closely the electron-probe method, but it is inherently slower and not applicable for a microspot. Moreover, the plating must be of another element than the base. The electron-probe, on the other hand, can be used as long as there is some difference in chemical composition between base and overlay. Measurement on a microspot permits the exploration of plate thickness on complex shapes to a degree hitherto impossible except with a very great amount of work.

It is also possible to determine thicknesses of more than one plating as long as the total thickness is within the penetration range. For instance, with an iron base plated by copper and followed by nickel and chromium platings, the intensity ratios of the X-ray lines of Ni/Cr, Cu/Ni, and Fe/Cu can be determined in a single measurement from which the thicknesses follow. One should be able to handle even such extreme cases with the electron probe as, say, gold on aluminum. The Al X-rays would be absorbed by a thicker gold coating, yet the curve of the intensity of the gold lines against voltage would still show a sudden change in slope, because after penetration has occurred the intensity will no longer increase as rapidly as before. Although mainly platings were discussed, the method may, of course, be equally well applied to any layered structure, inorganic or organic, e.g. ceramic enamels, lacquers, or natural integuments.

Electron probes have been developed and are now available commercially, and undoubtedly they will find increasing use in the measurement of plating thicknesses.

Rudolph Kriegler was born in Budapest Hungary, in 1933. He received his degree in Physics at Budapest from the Eotvos Lorand University for Sciences in 1956. He left Hungary in the fall of the same year and came to Canada. Studying physical electronics at the University of Toronto for one academic year, he was awarded a Master's degree in 1958. Then he joined the Department of Physics at the Ontario Research Foundation and has been working on X-ray spectroscopy since.

Dr. Berthold W. Schumacher was born in Germany in 1921, studied Physics under E. Regener at the Institute of Technology in Stuttgart, received the degree Dr.-rer.-nat. of PhD in Physics in 1953 developing electron beam probes for gas density measurements. After spending one year as design engineer in nuclear and X-ray electronics immigrated to Canada in 1954 joining the Ontario Research Foundation the same year. Dr. Schumacher was appointed Director of the newly established Department of Physics of O.R.F. in 1958. Present fields of activities include density gaging in cold, hot, or rarefied gases using electrons from isotopes or machines, vacuum technology, X-ray spectroscopy and electron microscopy. Dr. Schumacher is a member of the American Physical Society, The Physical Society, England, Deutsche Physikalische Gesellschaft, Canadian Association of Physicists.

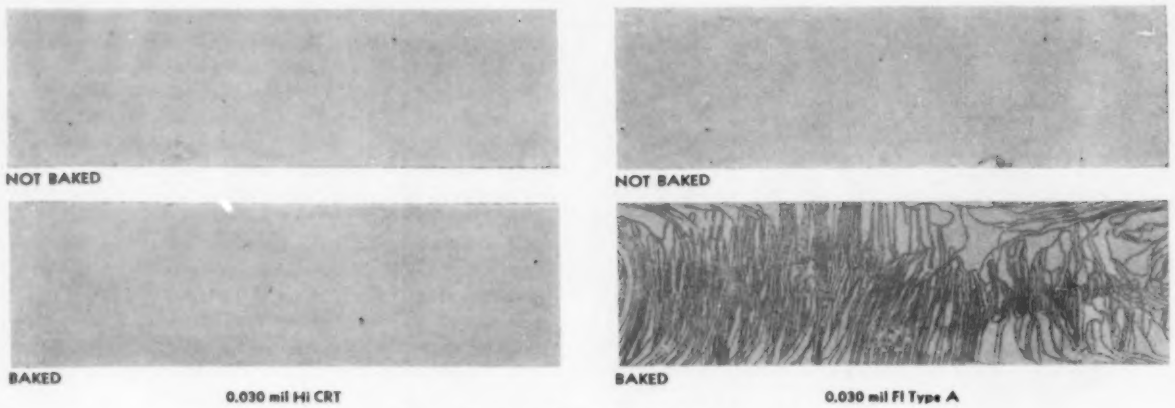


Fig. 1. Electrographic prints of chromium plates.

EVALUATION OF MODERN METHODS OF IMPROVING THE CORROSION RESISTANCE OF PLATED ZINC BASE DIE CASTINGS

by M. R. CALDWELL and L. B. SPERRY*

In March 1959, the authors published a research bulletin on the advantages of duplex nickel over other methods of improving the corrosion resistance. We preferred to call our duplex nickel "Doehler Double Plate" as the Doehler-Jarvis Division had pioneered its use for plating zinc base die castings for parts that must withstand severe out-of-door exposure. We reported that for more than four years comprehensive corrosion tests had been followed with the conclusion that this double plate was the soundest, most logical and most economical method of obtaining a substantial improvement in the protection of the zinc die casting. The degree of improvement was in the order of 25–33 per cent, conservatively speaking.

Therefore, in August 1957, we installed the first duplex nickel in a large copper-nickel chromium plating automatic. Our experience on parts used on 1958 model cars was phenomenal. That is, the appearance after one winter was far superior to other parts plated with equal thicknesses of copper, nickel, and chromium. Furthermore, we proved that good operating conditions could be maintained throughout the year. Impurities such as organic breakdown products, zinc, copper, and chromium, did not build up in the solutions to the point of affecting the deposit, either from the protection offered or from the adhesion obtained. The results were so successful that we have used this double plate on all automotive exterior parts, starting with the 1959 models.

During the last two years, several other methods have been studied and introduced for evaluation. Early this year we laid out a program of comparing the results obtained with several types of chromium over duplex nickel. We used 0.0008 in. of duplex nickel over 0.0004 in. of copper as a standard base. The objective was to find the best chromium deposit over duplex nickel. In this way it was hoped that a combination would be found that will withstand out-of-door exposure for more than one year—possibly three to four years.

So far, we can only report the results of electrographic printing, Corrodkote, and CASS Tests. A set of the parts are on exposure in Detroit now, but a complete report may take years.

It has proven to be most interesting to examine a set of each group by the electrographic printing method which Battelle has used so successfully. This method reveals any cracks or pores through the chromium down to the nickel. Photographic paper dampened with a solution of dimethylglyoxime is placed on the panel. We applied approximately ten pounds per square inch and then made the panel anodic. Seven and a half volts were applied which passed about 4 milliamperes per square inch for 2.25 minutes. Wherever nickel is exposed, by cracks or pores in the chromium plate, nickel dimethylglyoxime is formed, which produces a red pattern on the paper.

Since the possible combinations of chromium plating baths, thicknesses of plate, and conditions used are infinitely large, only a few were studied in this work, and a vast amount of further work can be done if all reasonable possibilities are to be explored. This work, therefore, is only a start, but we believe that it reveals some most interesting facts and will dispel some popular misconceptions.

In selecting the copper-nickel plated panels (2 by 5.5 in.) for these tests, each one was checked by magnegage to insure proper thickness of nickel plate. The chromium plate thickness from each individual bath used was checked by drop test in the thickness range of 0.010–0.020 mils. Chromium thicknesses of 0.030 and 0.050 mils were applied by using multiples of the time necessary to apply 0.010 mil.

*Manager of Electroplating and Finishes and Chief Chemist respectively, Doehler-Jarvis Division, National Lead Company, Grand Rapids, Michigan.
This paper was originally present at the American Zinc Institute Plating Symposium, held at the Hotel Statler Hilton, Detroit, Michigan, on November 11 and 12, 1959.

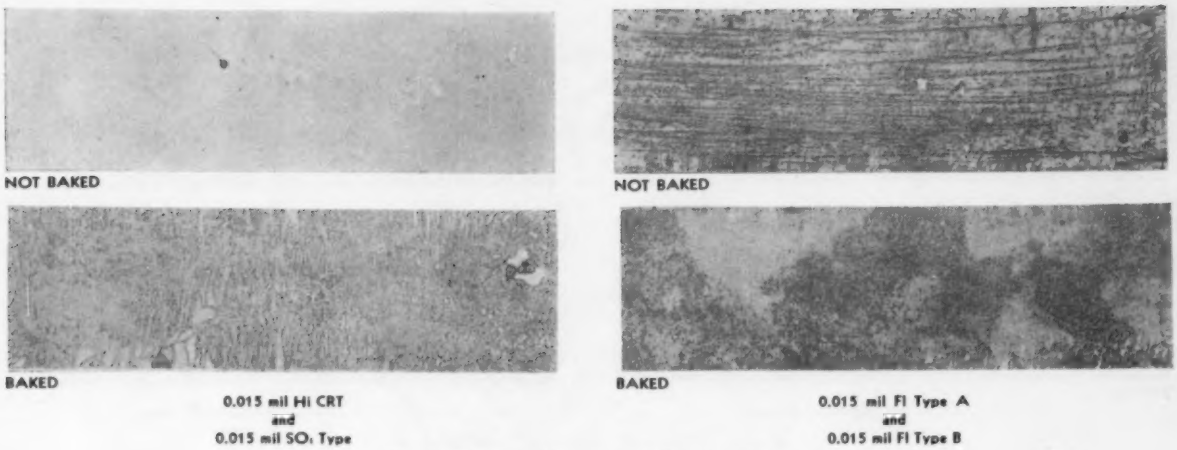


Fig. 2. Electrographic prints of chromium plates.

The individual baths used, and the conditions employed in their use, were as follows:

Designation	Anion	Tatio	Temperature °F	Current Density asf	CrO_3-Oz/gal
SO_4 Type	SO_4	100–1	110	195	32
Hi CRT*	SO_4	150–1	130	230	45
Fl Type A	Fl,SO_4	—	120	260	49
Fl Type B	Fl,SO_4	—	120	195	26

*This high-concentration, high-ratio, high-temperature bath was selected for study because Battelle Memorial Institute, working for the American Zinc Institute, had determined that it had outstanding merit with respect to cracking.

The two sulfate baths were used together as one duplex plate, and the two fluoride-type baths were used together as another duplex plate.

Four complete sets of panels were plated, consisting of nine groups of four panels each. Of these four panels in each group, two were baked. The sets were used as follows:

1. Electrographic printing—as used by Battelle.
2. Corrodkote Test—five 20-hour cycles.
3. CASS Test—five 16-hour cycles.
4. Exposure Test—on a Detroit roof.

ELECTROGRAPHIC PRINTING TESTS

These tests showed great difference in the chromium plate, in the porosity, and in the cracks down to nickel plate, and in the effect of baking.

Fig. I shows that baking either may or may not cause cracking (crazing) of the chromium plate. There is no cracking caused by baking a 0.030 mil Hi CRT plate, but a 0.030 mil Fl Type A plate shows much cracking.

Fig. 2 shows duplex chromium plates of the same total thickness as that shown on Fig. I. The sulfate type duplex, not baked, shows only a very slight porosity, the same as the single type. On baking, however, a very fine crack pattern is produced. On the fluoride type duplex, the formerly crack-free plate is now cracked. Baking changes the pattern, which becomes mottled.

Fig. 3 shows 0.050 mil of Hi CRT plate and 0.050 mil of Fl Type A. The unbaked Hi CRT is crack-free, and the Fl Type A shows cracking only on the edges, where the current density was slightly higher. Both are cracked after baking—the Fl Type A more so.

Fig. 4 shows duplex chromium plates of the same total thickness (0.050 mil) as that shown on Fig. 3. Unbaked, the sulfate type duplex now shows cracking on the high-current density edges, and is cracked and mottled after baking. The Fl type duplex is finely cracked before baking, and more so afterwards.

Fig. 5 shows porosity in 0.010 mil of SO_4 type plate, which is unaffected by baking. No cracks extend through to the

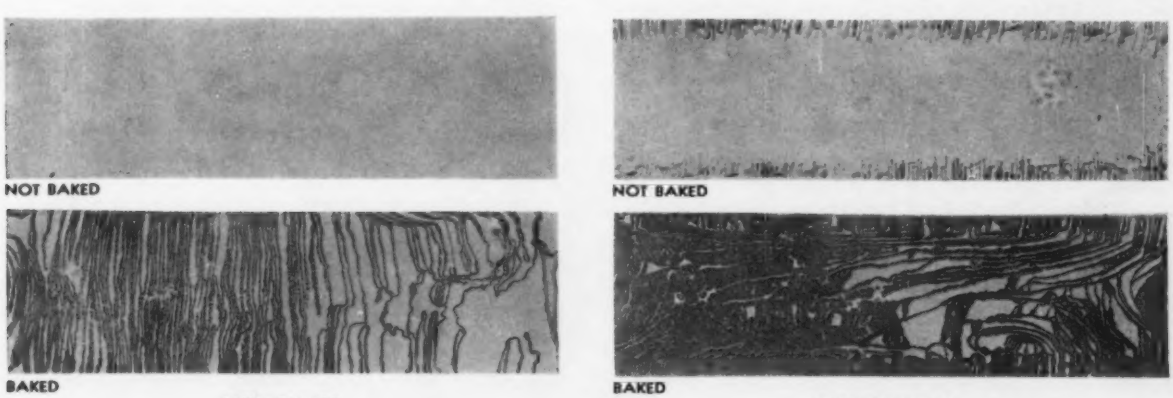


Fig. 3. Electrographic prints of chromium plates.

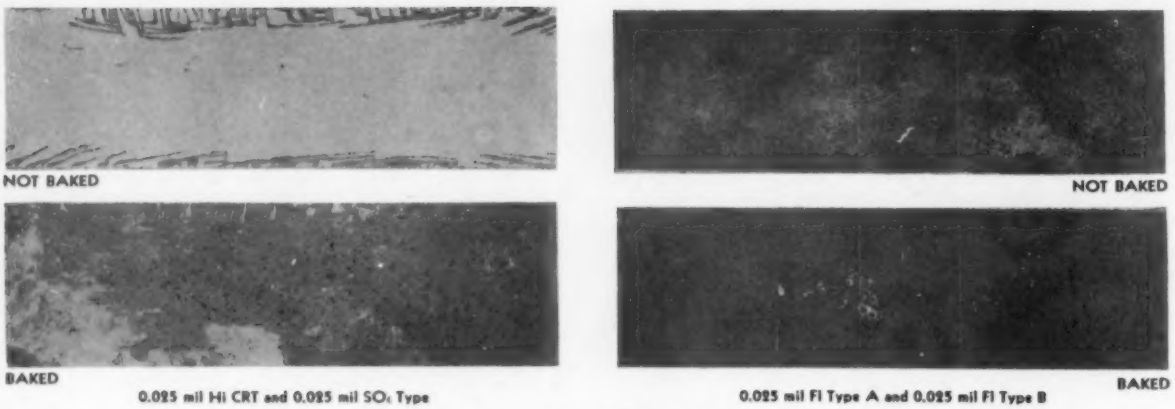


Fig. 4. Electrographic prints of chromium plates.

nickel plate. The 0.030 mil duplex sulfate type plate shows practically no porosity, but is cracked after baking.

The electrographic printing tests agree with the accelerated corrosion tests in one respect only, and this is not evident from the ratings. It was noticed that the chromium plates which were shown to be cracked, also showed a brown stain in the CASS test. This film was easily wiped off while wet, but became difficult to remove when dry. Panels were not rated down because of it. Other panels, which showed a different type of stain which could not be wiped off without using an abrasive, were down-graded for staining. The former type stain was not detectable in the Corrodkote test, but the latter resulted in an adherent film, presumably of nickel corrosion products and kaolin.

ACCELERATED CORROSION TESTS

In rating the panels, 10 was given for perfect, down to 0 for 50 per cent or more defective. Rating factors were assigned to various defects in proportion to their severity, and a total rating was calculated from these.*

In examining the ratings on the CASS and Corrodkote Tests, it is to be noted that both these tests had to be prolonged to 5 times the usual duration in order to clearly bring out differences in the corrosion resistance.

At the completion of the 100-hour Corrodkote Test, only two lots out of the 18 had fallen below a rating of 8; and after 80 hours in CASS, only one lot out of the 18 had fallen below a rating of 8. This clearly indicates the remarkable corrosion resistance afforded by Double Plate* duplex nickel, regardless of what chromium plate is applied over it. It seems clear from these tests, however, that there are even further improvements to be made by the application of the proper kind of chromium plate.

It is evident from studying the data that there is not good correlation of the CASS and Corrodkote tests. In general, the CASS test seems to enlarge surface pits, and cracks in the chromium, more than the Corrodkote test. It remains to be seen which of these tests will correlate better with the roof exposure tests.

Too much reliance should not be placed upon the total ratings. The weighting factors used are purely arbitrary quantities, and can be misleading. For instance, the panels plated with 0.010 mil of sulfate chromium, and those plated with 0.050 mil of Fl Type A chromium, show unsightly blemishes—surface pitting and some filiform corrosion (worm tracks) on the former, and crazing on the latter; yet because the weighting factor is 0.1, these panels have ratings between 9 and 10. It should also be mentioned that, to our knowledge, surface pits of this order of magnitude have not been observed on parts in service.

It is also evident from the CASS and Corrodkote ratings that baking has practically no effect on the standard plate of 0.010 inch of sulfate type chromium. Both panels show large surface pits, as illustrated in Fig. 6. Also shown here

*This weighted-area rating method has been used by Chrysler Corporation.

*Doehler Double Plate.

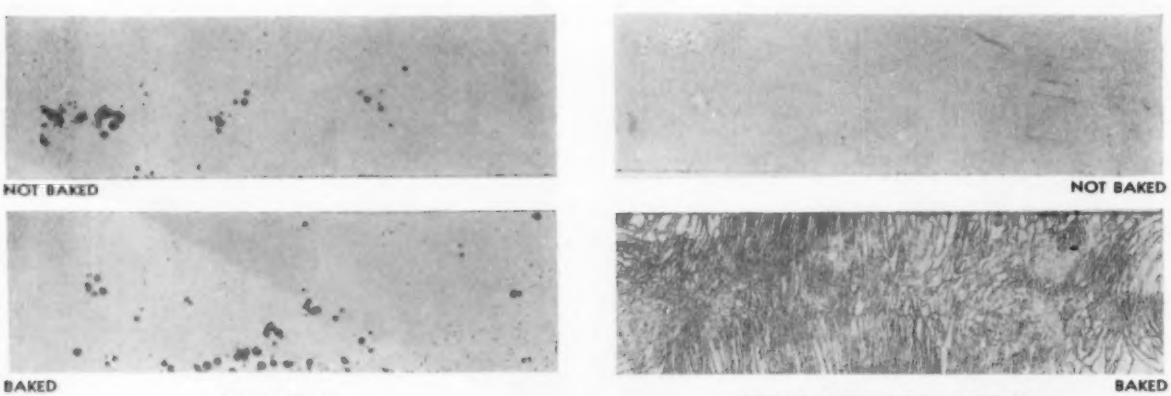


Fig. 5. Electrographic prints of chromium plates.

CASS TEST RATINGS—80 HOURS

Lot No.	Type of Chromium	Thickness (Mils	Not Baked		Baked	
			Rating	Type of Defect	Rating	Type of Defect
1	SO_4 Type	0.010	9.4	SP	9.1	SP
2	Hi CRT	0.030	9.5	SP, Corr, Bl	9	SP, Corr, Bl
3	Hi CRT	0.015	9.7	SP	9	Cz
	SO_4 Type	0.015				
4	Hi CRT	0.050	9.8	SP	8.4	SP, Corr, Bl
5	Hi CRT	0.025	9	Cz	9.9	Cz
	SO_4 Type	0.025				
6	Fl Type A	0.030	6	Corr, Bl	9	Cz
7	Fl Type A	0.015	8	St, Cz	8.5	St, SP
	Fl Type B	0.015				
8	Fl Type A	0.050	9.6	Cz	9.8	Cz
9	Fl Type A	0.025	8.6	St, SP	8.8	St, SP
	Fl Type B	0.025				

CORRODKOTE TEST RATINGS—100 HOURS

Lot No.	Type of Chromium	Thickness (Mils)	Not Baked		Baked	
			Rating	Type of Defect	Rating	Type of Defect
1	SO_4 Type	0.010	9.9	SP	9.9	SP
2	Hi CRT	0.030	8.7	SP, Corr, Bl	9.8	St
3	Hi CRT	0.015	9.9	SP	9	Cz
	SO_4 Type	0.015				
4	Hi CRT	0.050	9.9	SP	10	
5	Hi CRT	0.025	9.5	St, Cz	7.7	St, Corr
	SO_4 Type	0.025				
6	Fl Type A	0.030	9.9	Corr	10	
7	Fl Type A	0.015	9	Cz	8.7	St, Corr
	Fl Type B	0.015				
8	Fl Type A	0.050	9.8	Cz	9.3	St, Cz
9	Fl Type A	0.025	9.2	St, SP	7	St, Corr
	Fl Type B	0.025				

Corr—Basis Metal Corrosion St—Staining Bl—Blisters
SP—Surface Pitting Cz—Crazing

is the effect of baking on a 0.030 mil duplex, sulfate type plate. Surface pits have been eliminated, but cracking has resulted.

Fig. 7 shows two still different effects of baking. On 0.030 mil Hi CRT plate, surface pitting was lessened but corrosion of the basis metal increased, and on 0.030 mil of Fl Type A plate, basis metal corrosion was eliminated but cracking resulted.

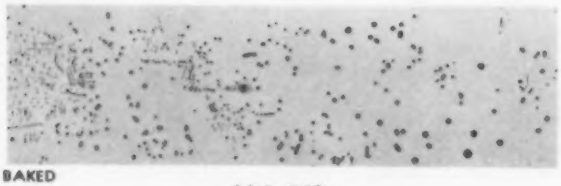
Fig. 8 compares unbaked, 0.030 mil thickness single chromium plates with like duplex chromium plates. In the Fl type, the duplex plate has resulted in elimination of basis metal corrosion, but caused heavy cracking and staining. In the sulfate type, the duplex plate shows no significant differences.

Fig. 9 compares unbaked, 0.050 mil thickness single chromium plates with like duplex chromium plates. In the Fl type, going to a duplex plate has resulted in severe cracking, and staining from nickel corrosion products. The single plate shows only moderate cracking. In the sulfate type, the single plate shows a few surface pits. The duplex plate has eliminated the surface pitting, but shows heavy cracks.

Fig. 10 shows the cracking and resulting stains from nickel corrosion products which seem to be characteristic of the duplex Fl type plates. All panels have 0.050 mil of duplex Fl type chromium plate, the first two being CASS tested and the last two, Corrodkote tested. The first panel of each pair was not baked, while the last was baked. The CASS test produces heavy, yellowish-brown, somewhat iridescent stains which do not wipe off readily with a wet cloth. The Corrodkote test produces a green-tinged, adherent coating which apparently consists of kaolin cemented together and to the metal by nickel corrosion products. Anyone who has Corrodkote tested nickel plate not covered with chromium is familiar with this coating.

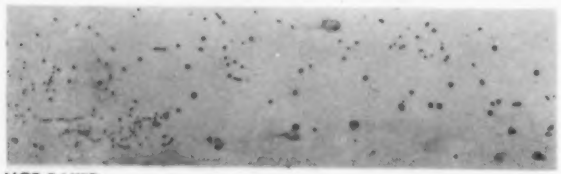
Fig. 11 shows like panels which were tested by CASS and Corrodkote. The first two were plated with 0.050 mil of Hi CRT chromium and baked. The first panel, CASS tested, shows surface pits, basis metal corrosion products and blistering. The second panel, Corrodkote tested, has only some barely detectable surface pits which are too small to show in the illustration. The other two panels were plated with 0.030 mil of duplex Fl type chromium, and were not baked. The first was CASS tested. The chromium is not only badly cracked, but corrosion of the nickel has resulted in undercutting of the chromium, so that most of the chromium at the center of the panel has come off in minute

NOT BAKED

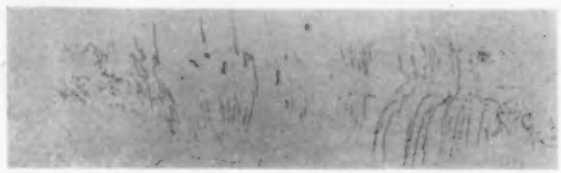


BAKED

0.010 mil SO_4



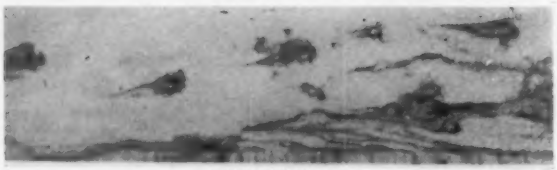
NOT BAKED



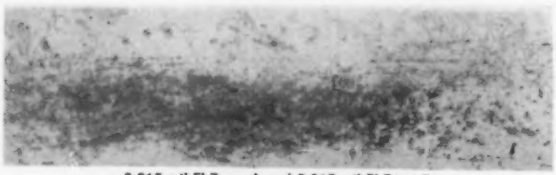
BAKED

0.015 mil Hi CRT and 0.015 mil SO_4

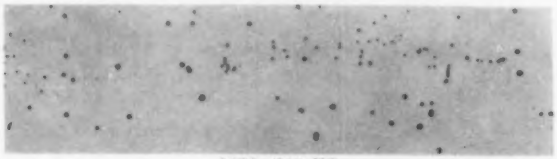
Fig. 6. Effect of baking. Panels CASS tested—five 16-hour cycles.



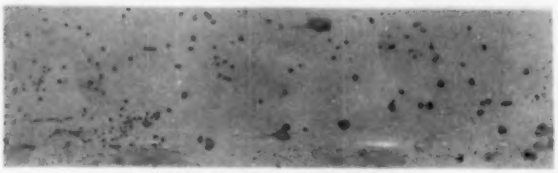
0.030 mil Fl Type A



0.015 mil Fl Type A and 0.015 mil Fl Type B



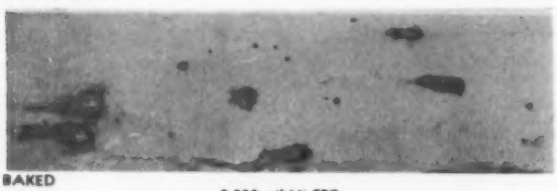
0.030 mil Hi CRT



0.015 mil Hi CRT and 0.015 mil SO_4

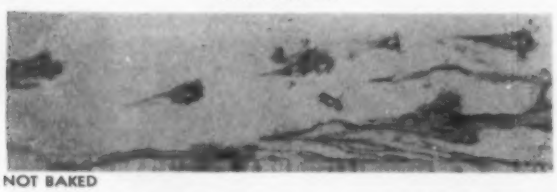
Fig. 8. Single chromium compared to duplex chromium. Panels not baked, CASS tested—five 16-hour cycles.

NOT BAKED



BAKED

0.030 mil Hi CRT



NOT BAKED

BAKED

0.030 mil Fl Type A

Fig. 7. Effect of baking. Panels CASS tested—five 16-hour cycles.

0.050 mil Fl Type A

0.025 mil Fl Type A and 0.025 mil Fl Type B

0.050 mil Hi CRT

0.025 mil Hi CRT and 0.025 mil SO_4

Fig. 9. Single chromium compared to duplex chromium. Panels not baked, CASS tested—five 16-hour cycles.

NOT BAKED

BAKED

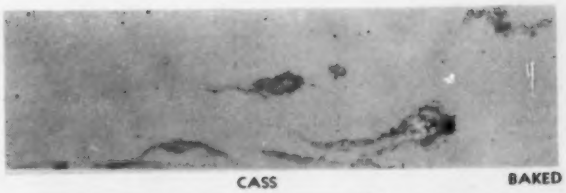
CASS tested five 16-hour cycles

NOT BAKED

BAKED

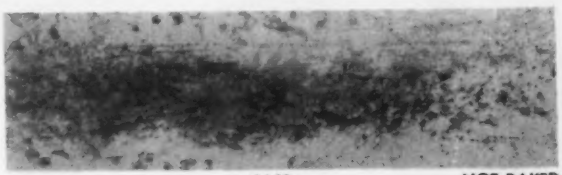
Corrodkote five 20-hour cycles

Fig. 10. Characteristic staining of Fl Type duplex chromium plates. 0.025 mil Fl Type A plus 0.025 mil Fl Type B.



CASS BAKED

Corrodkote BAKED
0.050 mil Hi CRT



CASS NOT BAKED

Corrodkote NOT BAKED
0.015 mil Fl Type A and 0.015 mil Fl Type B

Fig. 11. Comparison of prolonged accelerated corrosion tests. CASS and Corrodkote, five 16-hour and five 20-hour cycles respectively.

flakes. The Corrodkote tested panel is also badly cracked, but only a slight stain exists at the center of the panel, and no chromium has flaked off.

The chromium plates which in our opinion gave the best all-around performance, baked or not baked, in the accelerated corrosion tests, were:

0.010 mil Sulfate type
0.030 mil Duplex Sulfate type
0.050 mil Fl type A

None of these plates showed any significant basis metal corrosion in the accelerated corrosion tests.

The 0.010 mil sulfate type chromium, baked or unbaked, showed only surface pitting in both accelerated corrosion tests; and in the Corrodkote test, there was no pitting on either the baked or unbaked panels at the end of the two 20-hour cycles.

The 0.030 mil duplex sulfate type chromium, in both tests, shows only surface pitting on the unbaked panels and only cracking on the baked panels.

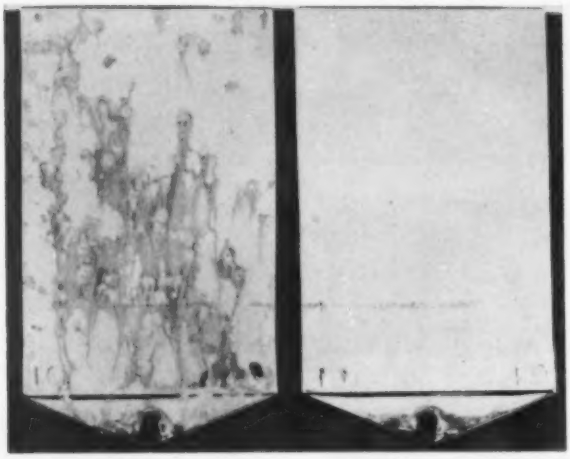
The 0.050 mil Fl type chromium showed only cracking in both tests, which was increased by baking.

It seems to us that there is not a great deal to choose between surface pitting, of the magnitude which we have observed on parts in service, and cracking. It is quite obvious that it is more economical to apply 0.010 mil of a single chromium plate than 0.030 mil of a duplex plate, or 0.050 mil of another single plate. Those who apply paint and bake, after plating, on some parts, must consider the effect of baking on the corrosion resistance. Those who do not bake would have one more choice of chromium plate—the 0.050 mil Fl type A.

It may be that further work will reveal a chromium plate which can be applied in reasonable thickness, will protect the duplex nickel against surface pitting, and will not crack, Until then, 0.010 mil of sulfate type chromium plate appears to be as good as any of those tested, over duplex nickel.

M. R. Caldwell is manager of electroplating and finishing for the Doehler-Jarvis Division and is located at the Grand Rapids Plant. He is a past president of the American Electroplaters' Society (1944) and is active on Research Committees of the AES and American Zinc Institute. He also is a member of the Electrochemical Society and the American Society for Testing Materials.

L. B. Sperry is chief chemist for the Grand Rapids Plants, Doehler-Jarvis Division. He has been active for many years in the American Electroplaters' Society has served on several ASTM Sub-Committees, and is a member of the Electrodepositors' Technical Society. Two of the papers which he has co-authored were award winners.



0.4 mil Cu
0.8 mil Bright Ni
0.01 mil Cr

0.4 mil Cu
0.5 mil S-free Semibright Ni
0.3 Bright Ni
0.01 mil Cr

Fig. 1. Diecast panels. CASS tested.

THE DEVELOPMENT OF DUPLEX NICKEL PLATING PROCESS

by M. M. BECKWITH*

THE introduction of duplex nickel plating has led the way toward a major improvement in the corrosion resistance of electrodeposited nickel coatings. This is particularly noticeable on exterior automotive parts where the application has been most widely accepted.

A semi-bright deposit** was introduced to the industry in October 1945 with the first application being on automotive bumpers as a replacement for Watts type nickel bath. As reported previously[1] the bath had superior levelling and the deposit was far more easily buffed than that from the Watts bath.

During the exploratory work leading to the introduction of the semibright plating bath, duplex deposits were made using the bright nickel then in operation. It is freely admitted that the purpose of the duplex coating at that time was not concerned with corrosion resistance but rather an attempt to eliminate or minimize buffing operations after nickel plating and before chrome plating.

During the period of 1946 to 1953, several manufacturing companies used bright over semibright nickel to accomplish a better appearance without the necessity of nickel buffing or accomplishing a similar quality with less steel preparation. Among some of the items plated in this manner were flat iron covers, toaster frames, automotive grilles and miscellaneous non-standard automotive accessories and small stampings not amenable to polishing of the basis metal.

Early in 1953 studies were made regarding the comparison of the corrosion resistance of bright, buffed Watts, buffed semibright and duplex nickel coatings. A bright nickel† was specifically developed to be compatible with the semibright nickel. During that year the first large bumper installation was started with duplex as a result of the improvement of

*Manager, Electroplating Division, The Harshaw Chemical Company, Cleveland, Ohio.

**Specifically, the Perflow process introduced by Harshaw Chemical Company.

NOTE—This paper was originally presented at the American Zinc Institute Symposium on November 12, 1959 at Detroit, Michigan.

†Perglow, product of Harshaw Chemical Company.

corrosion resistance shown by the test panels. This was followed by additional installations early in 1954.

In the summer of 1954 the first installation on zinc base die castings was started and results were quite satisfactory. This installation was on a hoist operated system.

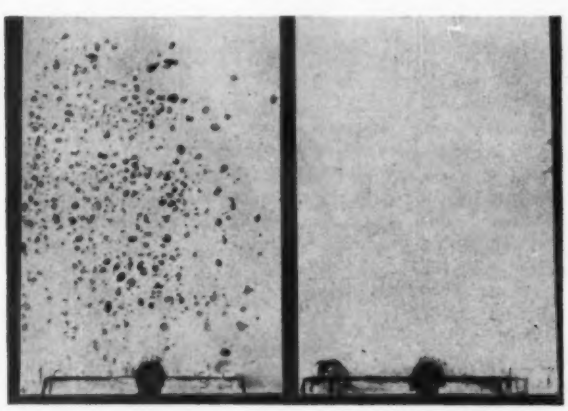
In the fall of 1955 the first installation in fully automatic plating equipment was made on a die cast plating line. There were a number of operational difficulties in this first installation and due to the pressure of production requirements it was not possible to work out the details and the project was suspended.

About 1957 the use of anodized aluminum to replace electroplated zinc base die castings was being advocated and in some cases already adopted. In the fall of 1957, the plating of zinc base die cast with duplex in fully automatic equipment was reactivated. The superior corrosion resistance of the duplex system compared to the bright nickel single coating was the basis for this renewed activity. From this beginning the use of duplex nickel has spread to its present volume and continues to demonstrate its quality of improved corrosion resistance.

During the early investigation of the duplex nickel it was noticed that fewer blisters or craters, which are the most objectionable defects developed on die castings, and far less basis metal corrosion products were produced. As a result of metalgraphic studies[2] it was observed that pitting which on bright nickel progresses continuously to the basis metal markedly slows down its rate of penetration at the duplex nickel interface. The pitting then proceeds slowly laterally with a much slower rate of vertical penetration.

Early in this development there was a tendency by others to attribute the improved quality to the radically different structures of the two deposits. This we do not believe to be the explanation since columnar semi-bright deposits can be produced which when covered with a laminar bright nickel do not improve the quality of the coating.

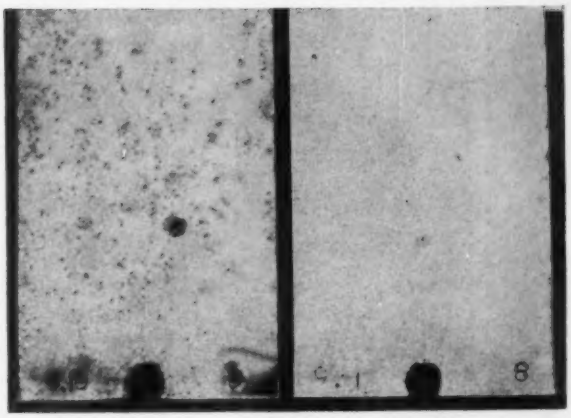
In order to explain the different degrees of protection afforded by bright nickel versus Watts type or semibright nickel, it has been believed that nickel deposits containing sulfur are inferior to those which are sulfur free. It is our belief that this is the major part of the explanation for improved corrosion resistance. A study was made[2] wherein the semi-bright deposit contained sulfur as well as the bright nickel deposit. Likewise the sulfur-free semi-bright nickel



1.3 mil Bright Ni
0.01 mil Cr

1.0 mil S-free Semibright Ni
0.3 mil Bright Ni
0.01 mil Cr

Fig. 2. Steel panels. Corrodkote test.



1.0 mil Bright Ni
0.01 mil Cr

0.7 mil S-free Semibright Ni
0.3 mil Bright Ni
0.01 mil Cr

Fig. 3. Steel panels. Outdoor exposure.

was used with the same bright nickel. Test panels were exposed in numerous sites and also tested with both the Corrodkote and Cass tests. The duplex system with the sulfur-free semi-bright was better than any others tested.

Figures 1, 2 and 3 illustrate typical results of accelerated, Cass and Corrodkote, tests and outdoor exposure at Cleveland on test panels.

Figures 4, 5 and 6 are typical of results of outdoor exposure of commercially plated parts. Such production parts show the same results as those demonstrated by the panels when subjected to accelerated corrosion tests.

When the duplex nickel is tested with the Corrodkote or Cass test, surface pitting in varying degrees develops. It is more noticeable in the Corrodkote test. It was first believed that this was a peculiarity of the accelerated test and was not evident on parts during outdoor service life. However, recent inspections have indicated that surface pitting does take place on our roof outdoor exposure but is not limited only to the duplex deposits and also occurs on bright nickel. The surface pitting on our roof is much worse than that which occurs on plated parts on automobiles. A recent survey of approximately 60 automobiles covering the model years 1956, 1957 and 1958 proves that bright nickel shows surface pitting as well as duplex. This is true on both steel and die-cast basis metals. Where the car has both bright nickel and duplex on exterior parts it is assumed that they have been exposed to the same corrosive medium. When the frequency and size of the pits are rated it is shown that the severity index for surface pitting only is favorable to duplex over steel and approximately identical over die castings. It is repeated that the above comments refer to surface pits only. There is no doubt that the duplex nickel system is better from the basis metal corrosion standpoint.

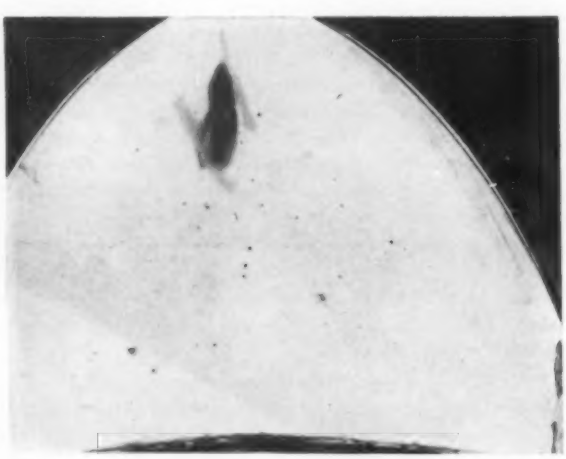
It has been demonstrated by our laboratory work that different types of bright over semibright yield varying degrees of improvement. The difference in behavior between the best and the poorest is substantial and quite significant. One explanation may be the potential differences between various bright nickel deposits and the semibright nickel of the duplex system. The bright nickel is anodic to the semi-bright and it is believed that this fact explains the sacrificial dissolving of

0.4 mil Cu
0.8 mil Bright Ni
0.01 mil Cr

0.4 mil Cu
0.5 mil S-free Semibright Ni
0.3 mil Bright Ni
0.01 mil Cr

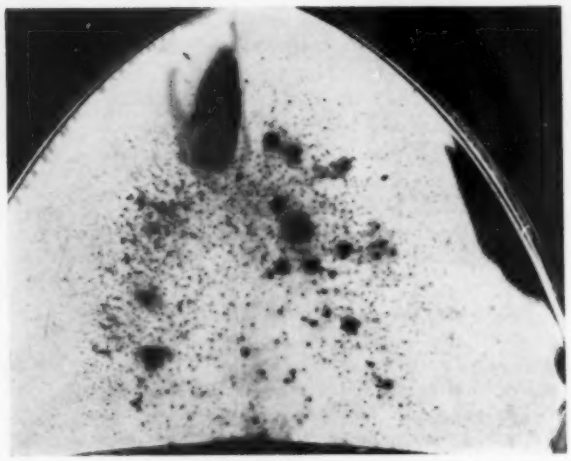
Fig. 4. Zinc diecast-production part. Outdoor exposure.

the bright nickel when the duplex is exposed to a particular corrosive attack as in the Corrodkote test. A test was conducted wherein three deposits were immersed in solution coupled externally. The deposits were chromium, semibright and bright nickel. They were immersed in acetic acid salt spray solution and in a solution made by diluting the Corrodkote slurry. The weight loss of the bright nickel was greatest in both test solutions. The bright nickel dissolved at approximately 40 times the rate of the semi-bright. This evidence together with potential measurements further clarifies the behavior phenomena of the duplex nickel coating. More complete details and data resulting from this investigation will be made available in the near future as this work is continued.



0.4 mil Cu
0.5 mil S-free Semibright Ni
0.3 mil Bright Ni
0.01 mil Cr

Fig. 5. Zinc diecast-production part. Outdoor exposure.



0.4 mil Cu
0.8 mil Bright Ni
0.01 mil Cr

Fig. 6 Zinc diecast-production part. Outdoor exposure.

ACKNOWLEDGMENT

The author wishes to thank Mr. A. H. DuRose and Mr. W. J. Pierce of The Harshaw Chemical Co. for their assistance in correlation of data and experience, thus making this presentation possible.

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[1]Miller, R. D., and A. H. DuRose, Proceedings AES, 1947, pp. 281–297.

[2]DuRose, A. H., and W. J. Pierce, Metal Finishing, March 1959, **57**, No. 3, pp. 44–50, 54.

Dr. M. M. Beckwith received a BA in chemical engineering, a Master's and PhD all from the University of Illinois. The last in 1936. He went to Guide Lamp, Division GMC, Anderson, Indiana on graduation, then joined Wyandotte Chemical in 1939. In 1942, Dr. Beckwith entered the U. S. Army and was assigned to the Manhattan Project, 1943. He joined Harshaw Chemical Company upon discharge from the Army in 1945. His present position with Harshaw is that of Division Manager.

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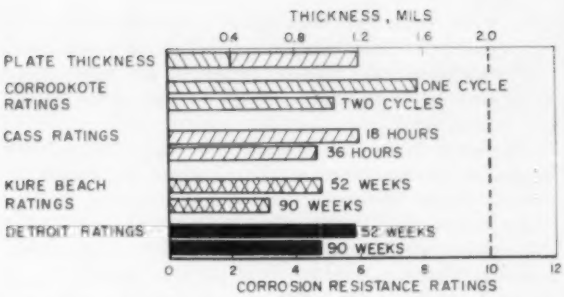

Fig. 1. Thickness and corrosion data for System A_1 including 0.4 mil of copper, 0.8 mil of bright nickel and 0.01 mil of chromium.

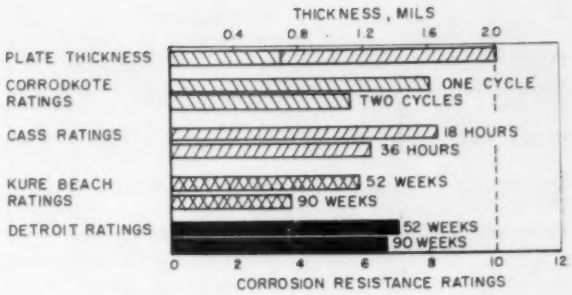

Fig. 2. Thickness and corrosion data for System B_1 including 0.7 mil of copper, 1.3 mil of bright nickel and 0.01 mil of chromium.

DATA ON THE CORROSION RESISTANCE OF ELECTROPLATED ZINC DIE CASTINGS

by W. H. SAFRANEK, H. R. MILLER, R. W. HARDY and C. L. FAUST*

This report, prepared for presentation to the Symposium sponsored by the American Zinc Institute on November 11 and 12, 1959, summarizes three programs on a search for practical methods of improving the corrosion resistance of electroplated zinc die castings. The performances of 46 different plating systems are tabulated. The data show that duplex nickel coatings are efficacious, but perform effectively only when they are plated with 0.02 mil, or more, of chromium. A composite of bright nickel and 0.055 mil of chromium also was effective in preventing corrosion during accelerated tests and outdoors at Kure Beach (North Carolina), Detroit (Michigan), and Columbus, (Ohio.)

INTRODUCTION

THE INVESTIGATIONS CONDUCTED at Battelle Memorial Institute for the American Zinc Institute on the corrosion resistance of electroplated zinc die castings included three programs, initiated consecutively at approximately yearly intervals. Under Program I, which began in the fall of 1957, the effect of an increase in the thickness of the copper and nickel plate was investigated. Program I also included a study of crackfree chromium and an evaluation of cobalt and cobalt-nickel alloy electroplates. The effect on corrosion performance of substituting electropolishing and leveling zinc plating for mechanical buffing was appraised, as well.

The study of crackfree chromium was continued during Program II, which also included an investigation of the performance of duplex nickel coatings, and additional studies on the effect of changing the thickness of the copper and nickel plates. Stainless steel and anodized aluminum were included in Program II, for comparison purposes.

Under Program III, a relatively comprehensive investigation of the effects of different thicknesses of duplex nickel and crackfree chromium was undertaken. In addition, composites consisting of chromium-nickel-chromium, bright nickel-duplex chromium, and duplex nickel-duplex chromium were included for evaluation.

PROCEDURES

Corrosion performance was evaluated in accelerated corrosion studies and outdoor weathering, using polished and buffed, 4 by 6-inch zinc die cast panels plated uniformly to conform with specific designated thicknesses of copper, nickel and chromium. Lots of 30 to 40 similarly plated panels were divided into groups of 5 or 6 panels which were exposed to different corrosive environments. The accelerated corrosion environments included the Corrodkote, the acetic acid salt spray and the copper-accelerated salt spray (CASS) tests.† The outdoor exposure sites were at Kure Beach (North Carolina), Detroit (Michigan), and Columbus (Ohio).

After appropriate periods of exposure, the condition of each panel was evaluated in accordance with the rating procedure described by D. M. Bigge.‡ With this procedure, any basis metal corrosion and any degradation in the appearance of the coating are added to derive a rating number. However, basis metal corrosion defects are weighed more heavily than defects within the coating. For example, a weight of 2.0 is given to corrosion blistering, whereas a weight of only 0.1 is given to corrosion pitting in the nickel plate.

To interpret the corrosion data in this report, the following relationships apply:

Rating Number	Per Cent Area Corroded, Weighted Area Basis	Rating Number	Per Cent Area Corroded
10	Less than 0.04	5	2.2
9	0.1	5	2.2
8	0.22	3	10.0
7	0.5	2	22.0
6	1.0	1	50.0

*Battelle Memorial Institute, Columbus, Ohio.

†The procedure for conducting the acetic acid salt spray test has been described by W. L. Pinner, Plating, **44**, 763–765 (1957). The procedure for Corrodkote testing has been described by Pinner, loc. cit., and by D. M. Bigge, Proceedings Am. Electroplaters Soc., **46**, (1959). C. F. Nixon, Proceedings Am. Electroplaters Soc., **46**, (1959), has described the copper-accelerated salt spray test.

‡D. M. Bigge, loc. cit.

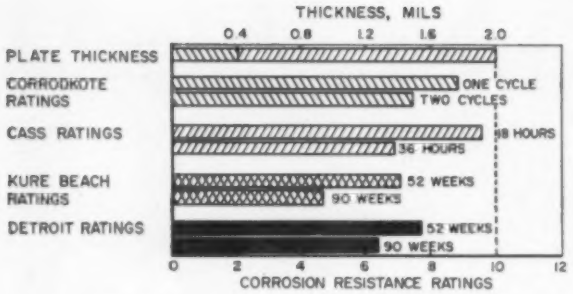

Fig. 3. Thickness and corrosion data for System C, including 0.4 mil of copper, 1.6 mils of bright nickel and 0.01 mil of chromium.

PROGRAM I DATA

Program I Corrosion data, compiled in Table I, revealed the following important effects:

(1) Chromium deposited 0.08 mil thick in a bright, crackfree form remained free of cracks and supplied excellent corrosion protection for the entire 90-week, outdoor exposure period.

(2) Increasing the thickness of the chromium and depositing it in a crackfree form was more effective in improving corrosion performance than a 75 per cent increase in the thickness of the copper plus a 62 per cent increase in the thickness of the nickel.

(3) A composite consisting of copper-nickel-chromium-nickel-chromium was very effective in preventing basis metal corrosion. With a final chromium thickness of only 0.01 mil, however, surface pitting was pronounced.

(4) Corrosion was reduced somewhat by substituting electropolishing and leveling zinc plating for mechanical buffing.

The extent of corrosion observed after one year of outdoor weathering at Kure Beach and Detroit correlated excellently with the extent of corrosion occurring during two, 20-hour cycles of Corrodkote or 36 hours of CASS, for all panels plated with copper, nickel, and chromium. Ninety weeks of exposure at Kure Beach, however, caused more corrosion than two cycles of Corrodkote or 36 hours of CASS.

The charts in Figs. 1, 2, and 3 show the effect of increasing the thickness of the copper and nickel. Similar thickness and corrosion data for panels plated with thicker, crackfree chromium are shown in Figs. 4 and 6, and Figure 5 charts the performance of the composite consisting of copper-nickel-chromium-nickel-chromium.

PROGRAM II DATA

Program II data, shown in Table I, confirmed the efficacy of crackfree chromium and demonstrated good results for a duplex nickel coating including a semibright nickel plate with a columnar structure. Inferior results were obtained with a duplex nickel including a semibright layer with a banded structure.

A composite of duplex nickel and 0.02 mil of chromium was more effective than a composite consisting of a similar duplex nickel and only 0.01 mil of chromium. Accelerated corrosion tests and outdoor weathering in Detroit and Columbus

TABLE I
CORROSION PERFORMANCE RATINGS—PROGRAM I

System	Plate Thickness, mils		Accelerated Corrosion Ratings						Outdoor Weathering Ratings						Principle Corrosion Defects
			Corrodkote[c]		Acetic Acid Salt Spray		CASS		52 Weeks[d]			90 Weeks[e]			
	Nickel[a]	Chromium[b]	One Cycle	Two Cycles	96 Hours	192 Hours	18 Hours	36 Hours	Kure Beach	Detroit	Columbus	Kure Beach	Detroit	Columbus	
A	0.8 bright	0.01 LTLR	7.8	5.2	5.0	3.0	6.0	4.7	4.7	5.8	8.6	3.1	4.7	5.9	Blisters
B	1.3 bright	0.01 LTLR	8.1	5.6	6.6	3.6	8.3	6.2	5.8	7.0	9.1	3.7	6.7	8.0	Blisters
C	1.6 bright	0.01 LTLR	8.8	7.4	7.4	4.4	9.0	6.8	7.0	7.7	9.6	4.6	6.4	8.9	Blisters
D	0.8 buffed	0.01 LTLR	5.8	5.0	5.4	3.4	6.4	3.2	3.9	1.5	6.0	2.3	1.2	5.2	Blisters, flaking
E	0.8 bright	0.01 LTLR	9.9	6.8	7.4	4.4	9.3	6.0	6.2	6.7	9.7	3.8	5.3	9.0	Blisters
G	0.8 cobalt	0.01 LTLR	9.5	9.2	—	—	10.0	9.3	6.0	8.2	7.7	3.2	6.4	4.7	Dark stain, pitting
H	0.8 Co-Ni	0.01 LTLR	9.4	7.4	5.6	3.4	9.0	6.2	4.8	6.2	8.9	1.9	5.1	7.3	Blisters
I	0.3 bright	0.5 crackfree[f]	9.8	8.0	9.7	9.5	—	—	8.6	9.9	9.9	8.6	9.6	9.8	Few tiny blisters
J	0.8 bright[g]	0.02 LTLR[g]	7.9	6.8	9.2	8.2	9.9	9.4	9.5	8.5	9.5	7.5	8.2	9.5	Piting
K	0.8 duplex[h]	0.01 LTLR	5.2	4.2	5.2	3.0	6.7	5.2	4.7	4.8	8.6	2.6	3.5	4.7	Blisters
L	0.8 bright	0.08 crackfree	10.0	9.2	10.0	9.7	9.9	9.4	8.9	9.9	10.0	8.6	8.8	9.6	Few small blisters

a. Each nickel plate was preceded with 0.4 mil of copper, except for System B panels, which were plated with 0.7 mil of copper. System E panels were electropolished and plated with leveling zinc instead of being mechanically buffed before copper plating.
b. LTLR chromium was deposited in a 105 F, 33-oz chromic acid bath having a chromic to sulfuric acid ratio of about 95:1. Crackfree chromium was deposited in a proprietary, self-regulating, mixed-catalyst bath.
c. After applying the Corrodkote slurry, subjecting the panels to between 95 and 99 per cent humidity for 20 hours, cleaning off the slurry and rating the panels, the complete cycle was repeated.
d. Exposed from about January 7, 1958, to January 7, 1959, at all three sites.
e. Exposed from about January 7, 1958, to October 7, 1959, at all three sites.
f. Satin-buffed, crackfree chromium.
g. This composite consisted of 0.4 mil of copper, 0.055 mil of bright nickel, 0.01 mil of LTLR chromium, 0.25 mil of bright nickel and 0.01 mil of LTLR chromium.
h. The structure of the first or semibright layer of this duplex nickel showed banding and columns, and was not characteristic of semibright nickel that inhibits basis metal blistering.

caused relatively severe pit-type corrosion in the nickel under only 0.01 mil of chromium, but only slight pitting in the nickel under 0.02 mil of chromium. At Kure Beach, the panels plated with 0.8 mil of duplex nickel and 0.01 mil of chromium were blistered, whereas only slight pitting was observed on the panels plated with 0.8 mil of duplex nickel and 0.02 mil of chromium. The performances of these duplex nickel-chromium composites are compared in Figs. 7 and 8.

Over 0.8 mil of bright nickel, as little as 0.025 mil of crack-free chromium was completely effective in preventing corrosion for 44 weeks in Detroit. A 0.055 mil, crackfree chromium plate was more effective at Kure Beach, where conditions were more severe during the period of December, 1958, to October, 1959. Figures 9 through 12 summarize the results obtained with the bright nickel-crackfree chromium composites.

The extent of corrosion during 44 weeks at Detroit cor-

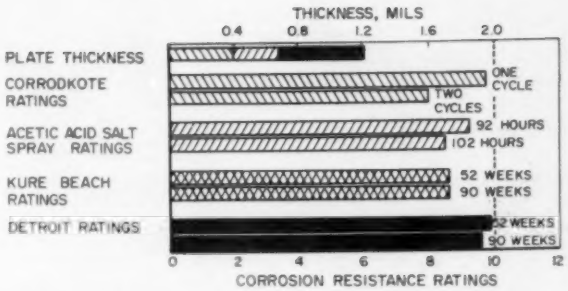

Fig. 4. Thickness and corrosion data for System I, including 0.4 mil of copper, 0.3 mil of bright nickel and 0.5 mil of satin-buffed, crack-free chromium.

TABLE II

CORROSION PERFORMANCE RATINGS—PROGRAM II

Accelerated Corrosion Ratings

System	Plate Thickness, mils		Corrodkote[c]		Acetic Acid Salt Spray		CASS		Outdoor Weathering Ratings After 44 Weeks Exposure[d]			Principle Corrosion Defects
	Nickel[a]	Chromium[b]	One Cycle	Two Cycles	92 Hours	192 Hours	16 Hours	36 Hours	Kure Beach	Detroit	Columbus	
M	0.8 bright	0.075 HTHR	9.7	9.0	10.0	10.0	Not exposed	Not exposed	7.9	10.0	9.9	Blisters
N	0.8 bright	0.04 HTHR	7.8	6.8	10.0	9.4	8.8	7.0	6.2	10.0	9.6	Blisters
O	0.8 bright	0.025 HTHR	9.5	8.5	10.0	10.0	9.8	9.1	8.3	10.0	9.9	Blisters
O′	0.8 bright	0.020 HTHR	8.1	6.3	9.7	8.3	4.3	3.9	Not exposed	Not exposed	Not exposed	
P	0.4 bright	0.055 HTHR	9.9	9.4	9.6	9.4	9.5	9.5	9.0	10.0	9.7	Few blisters
Q	0.8 bright	0.055 HTHR	10.0	9.4	10.0	10.0	10.0	9.7	8.9	10.0	9.9	Few blisters
R	0.8 strike plus bright	0.01 LTLR	6.9	4.8	8.6	5.2	5.6	2.3	1.3	4.6	6.0	Crater corrosion, stain
S	0.8 strike plus bright	0.055 HTHR	9.2	7.7	8.4	7.8	9.6	9.3	7.6	8.7	8.3	Blisters, stain
T	0.45 strike plus bright	0.055 HTHR	8.7	6.6	7.2	6.4	Not exposed	Not exposed	6.3	6.2	7.4	Blisters, stain
U	0.8 bright	0.055 HTHR	10.0	9.5	9.8	9.6	9.7	9.4	8.7	9.9	9.6	Few blisters
V	0.8 duplex[e]	0.01 LTLR	8.4	6.7	7.4	4.0	Not exposed	Not exposed	7.2	8.0	7.8	Blisters, pitting
W	0.8 duplex[f]	0.02 LTLR	10.0	9.8	10.0	9.8	10.0	9.9	9.9	10.0	9.5	Slight pitting
W′	0.8 duplex[f]	0.01 LTLR	10.0	8.2	10.0	10.0	9.9	9.7	Not exposed	Not exposed	Not exposed	
X	0.8 duplex[f]	0.01 LTLR	9.2	9.1	9.2	7.6	9.8	8.8	5.9	9.9	9.4	Blisters, pitting
Y	0.8 bright	0.06 HTHR[g]	10.0	9.8	9.7	9.7	9.9	9.9	Not exposed	Not exposed	Not exposed	—
SP[h]	0.4 bright	0.018 HTHR	8.7	6.1	8.8	7.4	8.1	5.6	3.5	7.3	7.4	Blisters
SQ[h]	0.8 bright	0.018 HTHR	10.0	8.6	9.6	9.0	8.9	7.0	6.5	9.3	9.0	Blisters
ST 3[i]	—	—	8.3	6.0	Not exposed	Not exposed	9.9	9.2	6.4	9.2	8.3	Pitting, rust stain
ST 4[i]	—	—	8.3	6.0	Not exposed	Not exposed	9.8	8.7	3.8	9.2	8.1	Pitting, rust stain
A Al[k]	—	—	9.0	8.7	Not exposed	Not exposed	7.6	6.9	9.4	Not exposed	8.3	Pitting, stain

a. Each nickel plate was preceded with 0.4 mil of copper, except for Systems R, S, T, and U. Systems R, S, and T panels were plated directly with nickel, using an experimental nickel citrate strike bath. System U panels were plated with only 0.05 mil of copper in a rochelle copper strike.
b. LTLR chromium was deposited in a 105 F, 33-oz chromic acid bath having a chromic to sulfuric acid ratio of about 95:1. HTHR chromium was deposited in a 130 F, 33-oz bath having a chromic to sulfuric acid ratio of about 155:1.
c. After applying the Corrodkote slurry, subjecting the panels to between 95 and 99 per cent humidity for 20 hours, cleaning off the slurry and rating the panels, the complete cycle was repeated.
d. Exposed from about December 1, 1958, to October 7, 1959.
e. The structure of the first or semibright nickel layer of this duplex nickel showed banding and columns.
f. The structure of the first or semibright nickel layer of this duplex nickel showed columns, but no banding.
g. This composite consisted of 0.4 mil of copper, 0.03 mil of HTHR crackfree chromium, 0.8 mil of bright nickel and 0.03 mil of HTHR crackfree chromium.
h. Recessed, zinc die-cast scoops.
i. Type 302, buffed stainless steel panels.
j. Type 430, buffed stainless steel panels.
k. Anodized 5357 aluminum alloy parts.

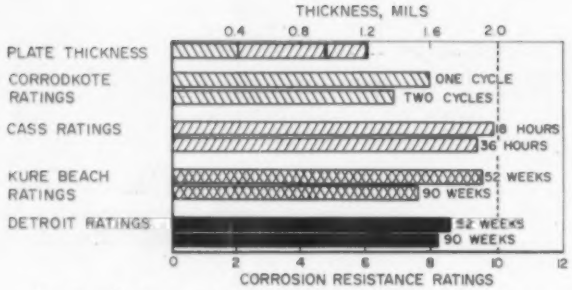

Fig. 5. Thickness and corrosion data for System J_f including 0.4 mil of copper, 0.55 mil of bright nickel 0.01 mil of chromium 0.25 mil of bright nickel and 0.01 mil of chromium.

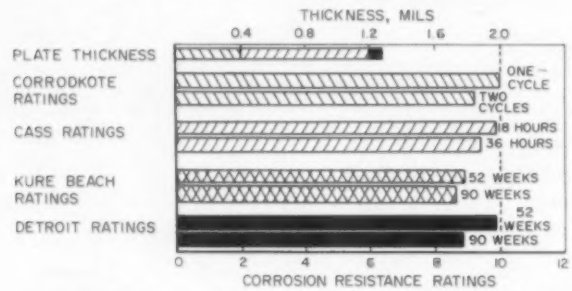

Fig. 6. Thickness and corrosion data for System L_f including 0.4 mil of copper, 0.8 mil of bright nickel and 0.08 mil of crack-free chromium.

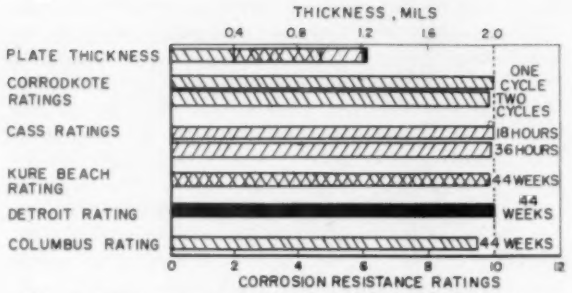

Fig. 7. Thickness and corrosion data for System W_f including 0.4 mil of copper, 0.8 mil of duplex nickel and 0.02 mil of chromium.

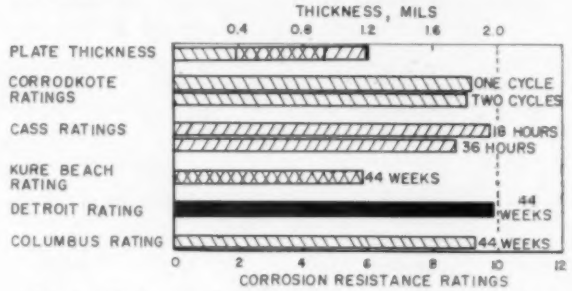

Fig. 8. Thickness and corrosion data for System X_f including 0.4 mil of copper, 0.8 mil of duplex nickel and 0.01 mil of chromium.

TABLE III
CORROSION PERFORMANCE RATINGS—PROGRAM III
Accelerated Corrosion Ratings

System	Plate Thickness, mils		Corrodkote[c]				CASS				Principle Corrosion Defects
	Nickel[a]	Chromium[b]	One Cycle	Two Cycles	Four Cycles	Six Cycles	18 Hours	36 Hours	72 Hours	108 Hours	
AA	0.4 duplex A	0.01 LTLR	9.2	8.4	6.7	Not determined	9.9	8.7	7.0	Not determined	Blisters, pitting
BB	0.4 duplex A	0.055 HTHR	10.0	10.0	9.7	8.9	10.0	9.8	8.9	8.1	Blisters
CC	0.8 duplex B	0.01 LTLR	10.0	9.7	8.2	7.1	10.0	10.0	9.5	8.6	Few blisters, pitting
DD	0.8 duplex B	0.025 HTHR	10.0	10.0	10.0	9.4	10.0	9.9	9.8	8.9	Few blisters, slight pitting
EE	0.8 duplex B	0.055 HTHR	10.0	10.0	10.0	9.9	10.0	10.0	9.8	9.4	Few blisters
FF	1.2 duplex B	0.01 LTLR	10.0	10.0	9.9	9.4	10.0	10.0	9.8	9.0	Few blisters, pitting
GG	1.2 duplex B	0.055 HTHR	10.0	10.0	10.0	9.9	10.0	10.0	9.9	9.4	Few blisters
HH	0.8 duplex B	0.025 LTLR	10.0	10.0	10.0	9.6	10.0	10.0	10.0	9.7	Few blisters, cracking
II	0.8 bright	0.025 LTLR	10.0	9.8	8.9	7.7	10.0	9.6	7.4	6.5	Blisters, cracking, stain
JJ	1.2 duplex A	0.01 LTLR	10.0	10.0	9.7	8.7	10.0	10.0	10.0	9.3	Few blisters, pitting
KK	0.8 bright	0.055 HTHR	10.0	10.0	9.9	9.5	10.0	10.0	9.5	8.8	Pinpoint corrosion, stain
LL	0.8 bright	0.01 LTLR	10.0	10.0	9.8	9.1	9.2	8.0	6.8	Not determined	Pinpoint corrosion, stain
MM	0.8 bright	0.055 duplex	10.0	10.0	9.4	8.7	10.0	8.9	7.4	6.3	Blisters, cracking, stain
NN	0.8 bright	0.150 duplex	10.0	10.0	9.9	9.7	10.0	9.7	8.7	8.4	Microcracking, stain
OO	0.8 duplex B	0.055 GDC	10.0	10.0	10.0	9.9	10.0	10.0	10.0	10.0	Very few tiny blisters
PP	0.8 duplex B	0.025 GDC	10.0	10.0	10.0	9.5	10.0	10.0	9.6	9.6	Few blisters
QQ	0.8 bright	0.055 GDC	10.0	10.0	10.0	9.3	10.0	10.0	9.6	8.6	Few blisters
RR	0.8 bright	0.025 GDC	10.0	9.9	9.1	7.9	9.8	7.4	6.2	Not determined	Blisters
SS	0.8 duplex B	0.055 duplex	10.0	10.0	9.8	9.4	10.0	9.8	8.5	8.0	Cracking and stain
TT	0.8 duplex B	0.025 duplex	10.0	10.0	9.3	7.8	10.0	9.8	9.4	8.8	Blisters, pitting

a. Each nickel plate was preceded with 0.4 mil of copper, except for System KK and LL panels which were plated with a chromium strike about 0.08 mil thick instead of a copper plate. Duplex nickel A consisted of 55 per cent of semibright nickel with a columnar structure and 45 per cent of bright nickel with a banded structure. Duplex nickel B consisted of between 70 and 77 per cent of semibright nickel with a columnar structure and between 23 and 30 per cent of bright nickel with a banded structure.

b. LTLR chromium was deposited in a 105 F, 33-oz chromic acid bath having a chromic-to-sulfuric acid ratio of about 95:1. HTHR chromium was deposited in a 130 F, 45-oz chromic acid bath having a chromic to sulfuric acid ratio of about 155:1. Duplex chromium was deposited in two successive, self-regulating, mixed-catalyst baths. The crackfree GDC chromium was deposited by a proprietary process including a bath operated at a temperature of 110F, and having a chromic-to-sulfuric acid ratio of about 120:1.

c. After applying the Corrodkote slurry, subjecting the panels to between 95 and 99 per cent humidity for 20 hours, cleaning off the slurry coating and rating the panels, the complete cycle was repeated six times.

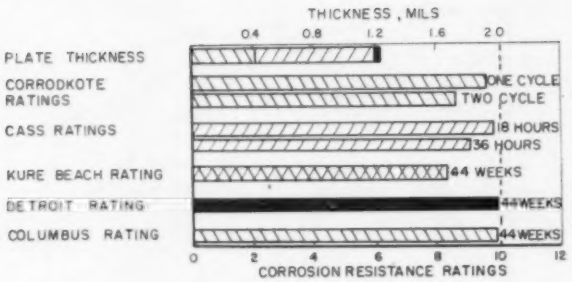

Fig. 9. Thickness and corrosion data for System O_j including 0.4 mil of copper, 0.8 mil of bright nickel and 0.025 mil of crackfree chromium.

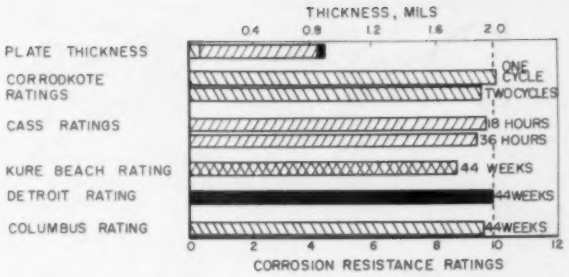

Fig. 12. Thickness and corrosion data for System U_j including a copper strike, 0.8 mil of bright nickel and 0.055 mil of crackfree chromium.

related fairly well with the extent of corrosion observed after one cycle of Corrodkote or 18 hours of CASS. During the same 44-week exposure period (from about December 7, 1959, to October 7, 1959), weathering conditions at Columbus were slightly more severe than they were in Detroit. Corrosivity at Kure Beach was even more severe, causing more corrosion during the same 44 week period than that caused by two complete cycles of Corrodkote or 36 hours of CASS.

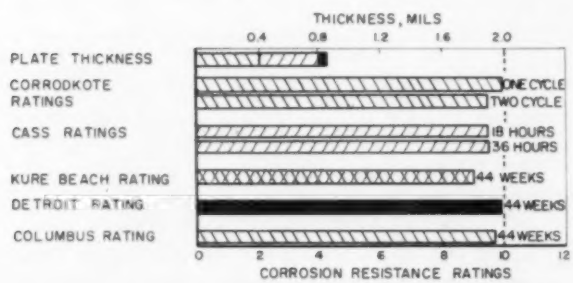

Fig. 10. Thickness and corrosion data for System P_j including 0.4 mil of copper, 0.4 mil of bright nickel and 0.055 mil of crackfree chromium.

Buffed stainless steel panels and anodized 5357 aluminum alloy were more severely corroded, in general, than the zinc die cast panels plated with a composite of bright nickel and crackfree chromium or a composite of duplex nickel and 0.02 mil of chromium. The performance ratings for the Type 302 and 430 stainless steel panels are shown in Figs. 13 and 14.

PROGRAM III DATA

The need for a thicker than 0.01-mil chromium plate with a duplex nickel coating was confirmed under Program III,

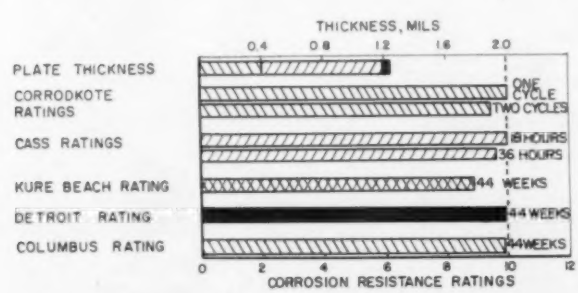

Fig. 11. Thickness and corrosion data for System O_j including 0.4 mil of copper, 0.8 mil of bright nickel and 0.055 mil of crackfree chromium.

which included a study of 0.4, 0.8, and 1.2 mils of duplex nickel. The performance of 0.055 mil of crackfree chromium over 0.4 or 0.8 mil of duplex was much better than that of only 0.01 mil of chromium over the same thickness of duplex nickel. Unsightly corrosion pits were observed in 1.2 mils of duplex nickel under 0.01 mil of chromium, whereas, 0.055 mil of crackfree chromium prevented such pitting.

Composites consisting of 0.8 or 1.2 mils of duplex nickel

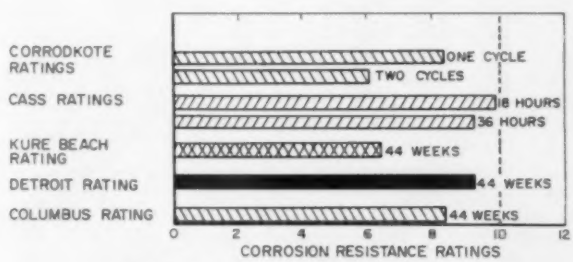

Fig. 13. Corrosion data for buffed, Type 302 stainless steel panels.

and 0.055 mil of crackfree chromium supplied more corrosion protection than the other composites included in this program. The results obtained for 20 different plating systems are compiled in Table III. Figs. 15 and 16 compare the performances of the duplex nickel-crackfree chromium composites with other composites evaluated on Programs I, II and III.

Composites of bright or duplex nickel and duplex chromium supplied more corrosion protection than composites of bright nickel and regular chromium (0.01 mil), according to Program I and III data. However, unsightly macroscopic cracks were

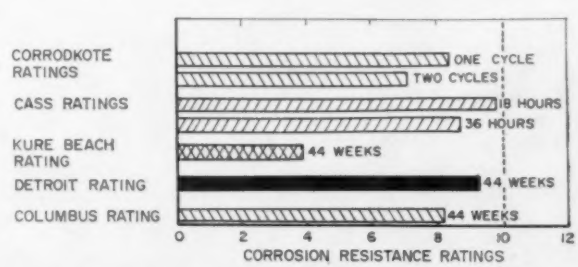

Fig. 14. Corrosion data for buffed, Type 430 stainless steel panels

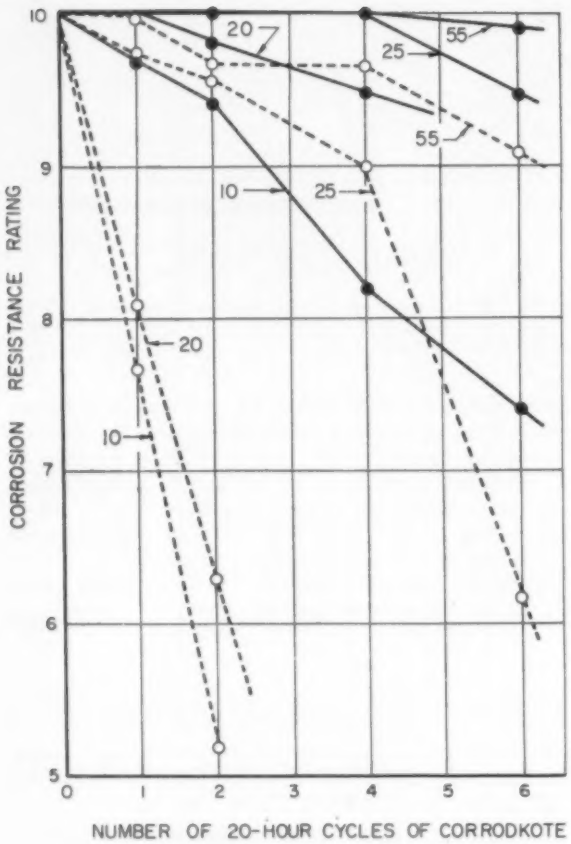

Fig. 15. Corrosion resistance of zinc die-cast panels. The panels were plated with 0.4 mil of copper, 0.8 mil of bright nickel (dash lines) or duplex nickel (solid lines) and different thicknesses of chromium, shown in microinches.

observed for two of the four nickel-duplex chromium composites, after Corrodkote or CASS evaluations. Such cracks can be avoided by plating chromium in a high-temperature high-ratio, chromic acid bath.

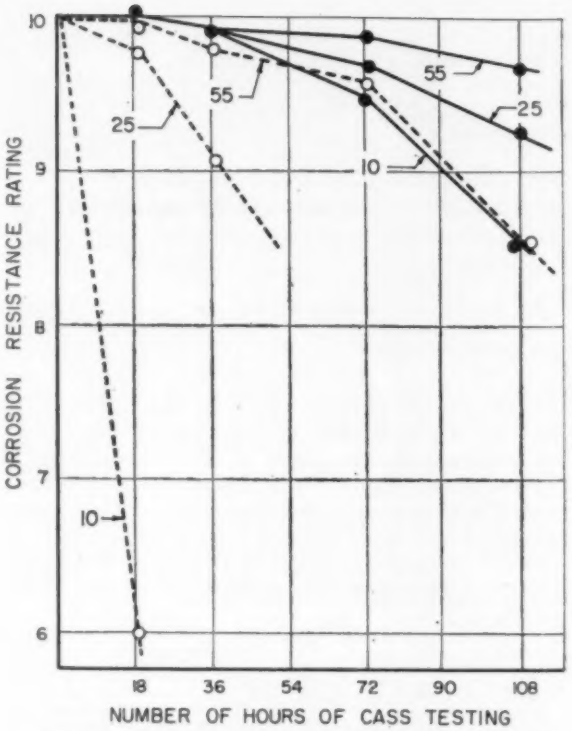

Fig. 16. Corrosion resistance to copper-accelerated salt spray of zinc die-cast panels. Plated with 0.4 mil of copper, 0.8 mil of bright (dash lines) or duplex (solid lines) nickel and different thicknesses of chromium shown in microinches.

DATA FOR COMPLEX SHAPES

Several different complex-shaped zinc die castings plated commercially with copper, duplex nickel and chromium were compared in accelerated corrosion tests with similar die castings plated commercially with copper and duplex nickel and experimentally with crackfree chromium. The results of these comparisons, compiled in Tables IV and V, showed a pronounced improvement in performance as a result of substituting crackfree chromium for regular chromium.

TABLE IV

COPPER-ACCELERATED SALT SPRAY DATA FOR COMPLEX-SHAPED ZINC DIE CASTINGS PLATED WITH DUPLEX NICKEL AND DIFFERENT THICKNESS OF CHROMIUM

		CASS Ratings With Commercially Plated Chromium					CASS Ratings With Crackfree Chromium				
Die Cast Part	Nickel Plate Thickness in Recess, mil	Chromium Thickness, mil	18 Hours	36 Hours	72 Hours	108 Hours	Chromium Thickness, mil	18 Hours	36 Hours	72 Hours	108 Hours
Tail light housings	0.60 to 1.05	0.011 to 0.014	10.0	9.5	7.5	6.2	0.027 to 0.039	10.0	9.8	9.3	8.2
Grilles	0.84 to 0.92	0.020	10.0	9.2	7.3	Not evaluated	0.027	9.9	9.8	8.6	Not evaluated
Guards	0.36 to 0.49	0.009	9.5	8.9	7.7	Not evaluated	0.030 to 0.053	10.0	9.8	9.2	Not evaluated
Ornaments	0.45 to 0.90	0.012 to 0.015	10.0	9.8	8.7	Not evaluated	0.038 to 0.062	10.0	9.7	8.5	Not evaluated
Recessed ornaments	0.22 to 0.31	0.003 to 0.004	8.2	5.4	Not evaluated	—	0.026	8.8	7.7	Not evaluated	—

TABLE V

CORRODKOTE DATA FOR COMPLEX-SHAPED DIE CASTINGS PLATED WITH DUPLEX NICKEL AND REGULAR OR CRACKFREE CHROMIUM

		Corrodkote Ratings With Commercially Plated Chromium					Corrodkote Ratings With Crackfree Chromium				
Die Cast Part	Nickel Plate Thickness in Recess, mil	Chromium Thickness, mil	One Cycle Ratings	Two Cycle Ratings	Three Cycle Ratings	Five Cycle Ratings	Chromium Thickness, mil	One Cycle Ratings	Two Cycle Ratings	Three Cycle Ratings	Five Cycle Ratings
Tail light housings	0.65 to 1.0	0.008 to 0.019	9.2	8.0	7.7	6.7	0.022 to 0.024	10.0	9.4	9.0	8.0
Grilles	0.84 to 0.92	0.020	10.0	9.3	8.5	8.2	0.033	10.0	9.8	9.3	8.8
Guards	0.36 to 0.49	0.009	9.2	8.4	7.6	6.7	0.030 to 0.035	9.2	8.9	8.3	7.6
Ornaments	0.45 to 0.90	0.012 to 0.015	9.9	9.9	9.9	9.8	0.038 to 0.048	10.0	10.0	10.0	10.0

The bright, crackfree chromium for these parts and for the Program III panels were deposited with the following conditions:

Chromic acid concentration	45 oz/gal
Sulfuric acid concentration	0.29 oz/gal
Chromic to sulfuric acid ratio	155:1
Trivalent chromium concentration	At least 0.5 g/l
Bath temperature	130F
Cathode current density	300 to 350 amp/sq ft

CONCLUSIONS

The results obtained for duplex nickel coatings on this program conducted for the American Zinc Institute confirm other encouraging data and justify even more extensive use of duplex nickel commercially. Furthermore, the data in this report show that a further improvement can be effected by plating crackfree chromium over duplex nickel. The duplex nickel should be at least 0.8 mil thick and the crackfree chromium should be at least 0.025 mil, but preferably about 0.055 mil thick in the low-current density areas.

William H. Safranek is assistant chief of the Electrochemical Engineering Division at Battelle Memorial Institute, Columbus, Ohio. As such, he is associated with various research projects aimed at developing finishes for protection against corrosion and finding new methods for producing metals. He has been at the research center since 1945.

Previously, Mr. Safranek had gained industrial experience, working in electroplating at the Alemite Die Casting Company and Apollo Metal Works. He received a Bachelor of Science Degree in chemistry from the University of Chicago.

The Battelle scientist has authored or coauthored some 25 technical articles and chapters in books. He is active in the work of The American Society for Testing Materials' Committee B-8 on electrodeposited metals. He served as chairman of the committee for the 1955 AES Tri-State Regional Meeting in Columbus, received the Carl Heussner Award in 1955, and the bronze medal award in 1956. He currently is serving as a member of the AES Editorial Board. Other technical groups with which Mr. Safranek is affiliated include The American Chemical Society, The American Society for Metals, and The Electrochemical Society. He is a past president of the Columbus Branch of the American Electroplaters' Society.

Hugh R. Miller is a graduate chemist in the Electrochemical Engineering Division at Battelle Memorial Institute. He has worked on metal finishing and plating problems since he joined the Battelle staff in 1953, shortly before receiving a BS degree in chemistry at Ohio State University. In 1954 and 1955, he took a leave of absence for a tour of duty with the Army Chemical Corp.

Since the American Zinc Institute started its project at Battelle, Mr. Miller has given his efforts to the problems of finishing die castings. In this connection, he was responsible for the preparation of the electroplated panels for the corrosion study and contributed o the development of the leveling zinc plating process published in 1958. He is a Columbus Branch member of the AES.

Robert W. Hardy is a chemist in the Electrochemical Engineering Division at Battelle Memorial Institute. He received his BS and MS degrees in chemistry from Lehigh University in 1953 and 1955, respectively. After serving two years with the U. S. Army Ordnance Corps, he joined the Battelle staff in 1956, and has since worked on various problems in the field of electroplating for protection against corrosion. He is a member of the ACS and The Electrochemical Society.

Charles L. Faust was a graduate assistant at the University of Minnesota, receiving his PhD in chemical engineering in 1934. For a brief period, he was with the Southwestern Bell Telephone Company and Western Electric Company. He joined the staff of Battelle Memorial Institute as a research engineer in 1934, and at present is chief of the Electrochemical Engineering Division. Metal finishing, electroplating, electrowinning, electrorefining, and extractive electrometallurgy, electrolysis and batteries, electro processes, and waste disposal are the subjects of the Division's activities. Author or coauthor of over seventy technical articles, chapters in five books, and over forty patents.

Dr. Faust was a member of the board of directors of the Electrochemical Society from 1943 to 1945 and 1947 to 1951. He was a vice president from 1947 through 1949 and president in 1950.

He was an associate editor of the Monthly Review and PLATING, publications of the AES from 1942 until 1949; associate editor of Modern Electroplating, second edition, 1953; associate editor of Electroplating Engineering Handbook 1955. At the present time, he is section editor of Chemical Abstracts, Section 4, Electrochemistry.

During the war, he served on a subcommittee of the War Metallurgy Committee. Now is a consultant for the Materials Advisory Board of the National Academy of Science. He is a registered Professional Chemical Engineer of the State of Ohio.

He is a member of the ACS, the Electrochemical Society, the AES and the Institute of Metal Finishing.

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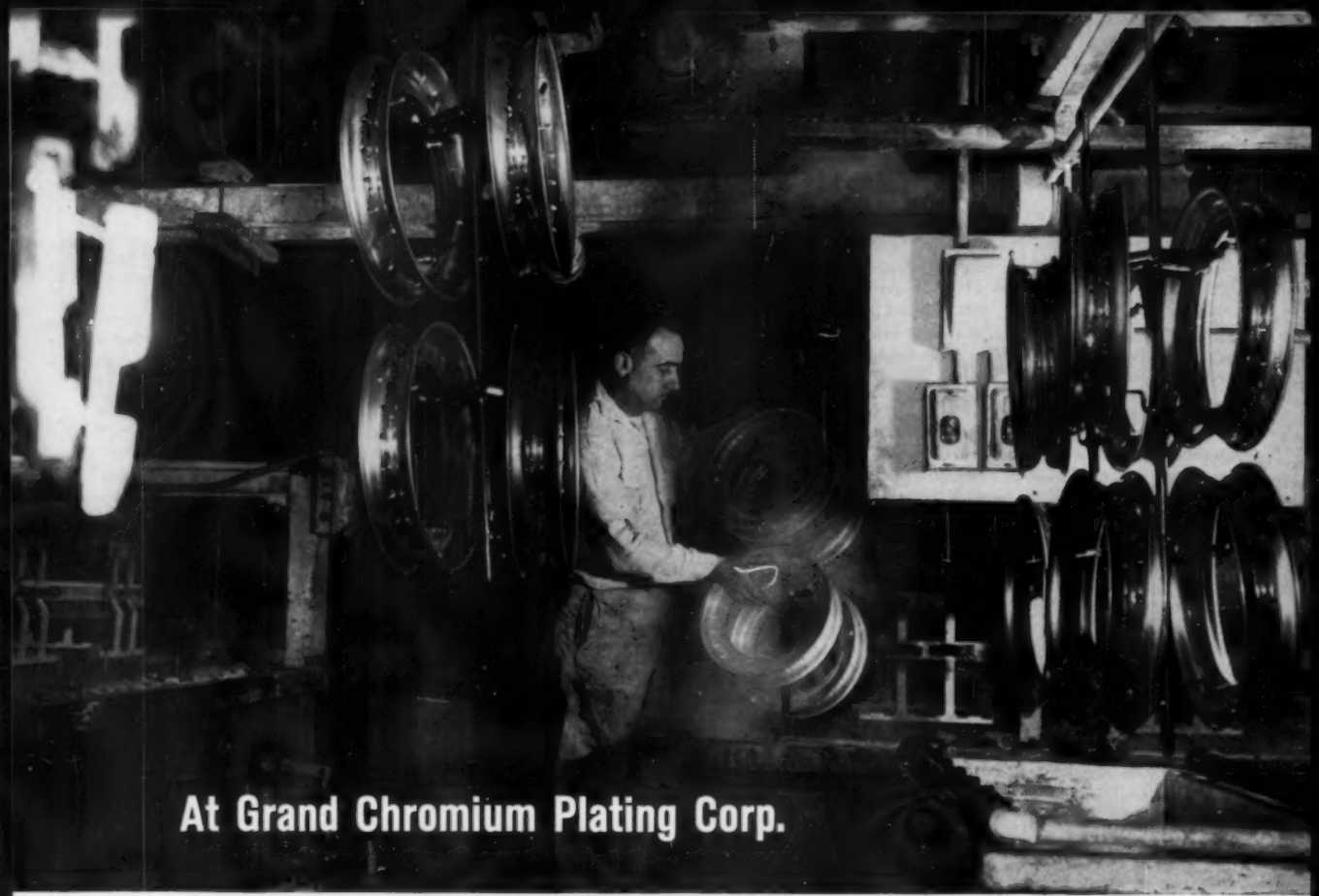

Copper Anode Consumption Reduced 20% with OFHC Anodes

Denser, more uniform copper deposits from OFHC Brand Anodes in a copper cyanide plating bath cut anode consumption 20% at Grand Chromium Plating Corporation of Brooklyn, New York. Plating over raw steel surfaces, Grand Chromium discovered that OFHC Anodes minimized the heavy preparatory buffing of rough areas as well as final buffing of plated parts required when using other anodes. With OFHC, only superficial buffing of "orange peel" was necessary and final buffing was drastically reduced. As a result, they ended up with the same amount of copper on their plated parts, using thinner initial deposits—cutting anode consumption 20%. Other benefits Grand Chromium derived by using OFHC Anodes were:

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AES's NEW MEMPHIS-MIDSOUTH BRANCH TEMPORARILY CHARTERED

With a nucleus of 18 members, the AES's new Memphis-Midsouth Branch has recently been granted a Temporary Charter by the Executive Board effective February 23, 1960. E. L. Lorenzen is the Branch's President Pro Tempore and Philip R. Dickinson, its Secretary Pro Tem.

Under AES law, the new Memphis-Midsouth Branch must operate effectively under Temporary Charter for a minimum three-month period before becoming eligible to apply to the Executive Board for Permanent Charter. If successful, it will become AES's 59th Branch and will become part of the Society's Dixie Region.

TO BRANCHES AND BRANCH SECRETARIES

1. A Return Sheet listing your Branch's accredited Delegates and Alternate Delegates will soon come to you. Via that Return Sheet, you will be expected to specify those accredited Delegates and/or Alternates who will be at the Los Angeles Convention to represent you in the deliberations of the Supreme Society. If none of your own Delegates or Alternates surely intend to attend the Convention, you will be asked to select and specify three choices among other Branches from which you wish the Credentials Committee to select one and vest your Branch's proxy in it. Your Return Sheet, to be acceptable to the Credentials Committee, must be signed by your Branch President and Branch Secretary. (Reference: AES Constitution Part I, Art. III, Sections 1 and 2).
2. A complete, certified Roster of your Branch Members in good standing as at June 30, 1960 must be in the hands of the National Executive Secretary on or before July 15, 1960. Upon arrival, his office will properly bill your Branch for Per Capita Taxes covering the fiscal year July 1, 1960—June 30, 1961. Due date for full payment of Per Capita Tax is September 1, 1960. (Reference AES Bylaws Part I, Art. V, Section 3).
3. There are available to you through National Headquarters, 1) The new gatefold Branch Membership combination promotion leaflet and application blank (Free limited quantities); 2) The vaunted booklet, "Milestones of AES" (Free) and 3) AES silver lapel buttons at $1.38 apiece and AES silver Branch Past President buttons at $1.43 apiece.

VITAL RESEARCH PROGRAM APPRAISED BY ITS GOVERNORS

The entire AES Research Program, including each of its seven present active Research Projects in American and Canadian universities and foundations, came under the penetrating scrutiny of the AES Research Committee at its quarterly meeting held, February 18, 1960, at the Benjamin Franklin Hotel, Philadelphia, Pennsylvania, with Chairman James D. Thomas presiding.

At the Philadelphia meeting, the Research Committee paved the way for an exhaustive final appraisal of each present project at a two-day meeting that it will conduct for this purpose at the Mark Twain Hotel in Elmira, New York, April 28–29, 1960. Meantime, Vice Chairman for Research D. G. Foulke and his four District Supervisors will conduct an evaluation of the status and effectiveness of each existing project for recommendation as to continuance, and the cost thereof for 1960–1961, to the Research Committee at its coming Elmira meeting.

In addition, the Research Vice Chairman and his task subcommittees will explore, for Committee reference and action, the wisdom and timeliness of undertaking a number of other preliminarily well-considered projects, including one involving aerospace finishing proposed by AES's Southwestern elements spearheaded by the Dallas-Fort Worth Branch. At Philadelphia, the Committee upheld its prior decision to terminate Project No. 17 at the conclusion of the current fiscal year ending June 30.

The Research Committee's program of stimulating appointment by AES Branches of Branch Research Finance Chairmen to lead Branch action in inspiring industrial companies of their respective areas to cooperate in the support of AES Research by joining AES as Sustaining Members was encouragingly reported by Vice Chairman for Finance Kergan Wells. Not only did he point out that an increase has been seen in new Sustaining Memberships during the past quarter but also that a number of companies that dropped their memberships as economy measures during the recent economic recession have since restored them.

The large continuing urgency of increasing Sustaining Memberships substantially was reemphasized as a "must" for a healthy AES Research Program vital to the best interests of plating, metal finishing and allied arts. And as a helpful means of cultivating and buttressing that sales effort regionally, Mr. Wells stated that a Regional Research Finance Chairman is being appointed for each major geographical area coast-to-coast. It was decided that these will meet with the Research Committee at a breakfast meeting to be held at the Los Angeles Convention, Wednesday, July 27.

PROVIDENCE-ATTLEBORO BRANCH CO-SPONSORS ELECTROPLATING SEMINAR

An Electroplating Seminar co-sponsored by the Providence-Attleboro Branch and the Division of Engineering Research and Development of the University of Rhode Island will be held at the University, Kingston, R. I., on Saturday, May 21, 1960.

PROGRAM

10:00 a.m. —Registration and Coffee Hour

10:30-12:00 —Tours of Campus

12:00- 1:00 p.m.—Luncheon—University Dining Hall

1:30- 5:00 —Technical Sessions

"Acid Pickling and Bright Dipping"
Dr. Walter Meyer, president of Enthone, Inc. New Haven, Connecticut

"Anodizing of Aluminum as Compared to Electro-Plating"
Byron Abedon, vice president of research and development, Engineering Products & Specialities, Inc., Pawtucket, R. I.

"The Role of Specifications in Precious Metals Plating"
Eldridge Camp, I.B.M. Corporation, Poughkeepsie, New York

"Plating Instrumentation and Controls"
Speaker to be announced

3:00 —Coffee Break

5:30- 6:30 —Cocktail Hour—Larchwood Inn, Wakefield, R. I.

6:30- 7:30 —Dinner at Larchwood Inn

SUSTAINING MEMBERSHIP INCREASES RESULTING FROM ACTIVE BRANCH EFFORT

While the recent economic recession raged everywhere affecting nearly everyone, some company Sustaining Memberships were recessed for the duration of the recession.

Thanks both to the confidence of industrial companies in the importance of the AES Research Program which Sustaining Memberships mainly nourish financially, and to the diligence of Research Finance teams of many AES Branches, including Detroit, Grand Rapids, Indianapolis, Waterbury, Los Angeles, Philadelphia and others, AES's roster of Sustaining Members has started its comeback. Since September 1959, not only has the drop ceased but about 14 new or restored Sustaining Memberships have brought the total to about its September 1958 status, with continued rise hopefully in sight until normalcy or better is reached.

EXECUTIVE BOARD ENACTS SIGNIFICANT LEGISLATION AT FEBRUARY PHILADELPHIA MEETING

Due-date for the payment of all Branch Per Capita Taxes becomes September 1 in 1960 under AES law as amended by the Supreme Society at its Annual Meeting held in Detroit, June 18, 1959. And any Branch whose Per Capita Tax for the fiscal year (July 1–June 30) has not been paid in full by or before November 1 must, under AES law, be declared "not in good standing". By action taken at its regular meeting held in Philadelphia, February 19–20, 1960, the Executive Board has supplemented Per Capita Tax policy as follows.

Each new annual edition of the AES's voluminous book, TECHNICAL PROCEEDINGS, will go to each AES member who, on National Headquarters' official membership records, is listed as being in good standing on November 1 of the current fiscal year by virtue of receipt at National Headquarters from his Branch, by or before that date, of his Per Capita Tax for said fiscal year. No copy of the book will, of course, issue to any member from whose Branch, official notification has been received by National Headquarters, by or before November 1, designating him as having resigned or as having been suspended by said Branch. No Per Capita Tax credit or refund of any sort will hereafter be allowed to any AES chartered Branch for any member deceased, resigned or suspended by that Branch to whom National Headquarters has issued a copy of that year's TECHNICAL PROCEEDINGS by reason of not having received official notification from said Branch, by or before November 1, of such member's death, resignation or suspension.

NATIONAL OFFICERS AT BRANCH MEETINGS

At that same meeting, the Executive Board adopted the following statement of policy as regards attendance by the six National Officers at Regional and Branch Annual Meetings, and the policy was announced at the SEVENTH INTERIM MEETING of the Supreme Society held in Philadelphia the day following the Board's meeting of enactment:

1. That National Officers, to the extent that the large demands of their own respective business duties and obligations and/or their other personal commitments and/or their's or AES's financial capacity permit, will accept direct and specific invitations from AES Regions or Branches, received by them a reasonable time in advance, to attend specific Regional or Branch functions.
2. That, so as to give each Region or Branch equal opportunity to enter into negotiations with the respective National Officers of their choice, PLATING MAGAZINE will annually invite all Regions and Branches to submit such invitations to such National Officers for consideration on a "first come-first served" basis.
3. That it will be clarified to Branches that 1) their respective charters neither provide nor imply any guarantee or promise or prospect or inference that they will normally be visited, *uninvited*, by any National Officer nor conversely, that the AES Constitution or Bylaws, or recorded or unwritten policy of the Supreme Society or of AES itself, require *uninvited* visit to any AES Branch or Branches as a condition of nomination or election to any AES national office or tenure as such.
4. That each Regional Annual Meeting will have the attendance of at least one of the six National Officers unless such Annual Meeting's date conflicts with a regularly scheduled meeting of the Executive Board or unless circumstances beyond control prevent.
5. That, if in the vicinity and can conveniently do so, a National Officer will attend any regular Branch monthly meeting even though uninvited.

OTHER ENACTMENTS AT PHILADELPHIA MEETING

The Board, at that same meeting, accepted and approved the certified statement of Clyde A. Zukswert & Co. covering that independent certified public accounting company's audit of the books of record and financial management and transactions of the AES itself and of its PLATING MAGAZINE and Research Program for the six-month fiscal period from July 1, 1959–December 31, 1959. It also approved the design of the certificate of the new Charles Henry Proctor Memorial Leadership Award. It also approved the amended Bylaws of the Membership Committee, and it named Irvin Weiss, Metal & Thermit Corporation, Grand Rapids, Michigan, to that Committee to serve the unexpired term of George E. Best whose resignation for business reasons, it accepted with regret and with appreciation for worthy service during his tenure.

The Board also approved the report of the Honorary Membership Awards Committee, and ratified the candidacies of two AES members endorsed by that Committee from among those names submitted by AES chartered Branches. It also adopted a resolution recommending to the Supreme Society that the next AES Industrial Finishing Exposition be held in St. Louis during the three-day period of June 16–18, 1964, concurrently with the AES's 51st Annual Convention to occur in that community June 15–18, 1964, with the St. Louis Branch as Convention host.

It also accepted, with appreciation, the International Nickel Company's invitation to permit that Company to sponsor the AES's annual paper award to be known as "The Precious Metal Plating Award of the American Electroplaters' Society" effective at once. Also approved by the Board at that two-day meeting was the date of February 11, 1961 for the EIGHTH INTERIM MEETING of the Supreme Society to be held at the Statler Hotel, Hartford, Connecticut, hosted by the New England Regional Council in conformity with Supreme Society enactment, June 18, 1959.

Among other business transacted, the Executive Board also approved the final budget of the 47th Annual Convention to be held in Los Angeles, July 24–28, 1960 as submitted by Walter P. Behlendorf, that Host Branch Convention Committee's Finance Chairman. Also ratified at that same meeting were the amendments to the Bylaws of the Research Committee that had been effected by that Committee the prior day.

BUSINESS AND PLEASURE—7th INTERIM MEETING AND 50th ANNIVERSARY OF PHILADELPHIA BRANCH

(1) AES Membership Committee Breakfast Meeting, left to right, Louis V. Gagnon, Boston; Kergan Wells, Toronto; Chester G. Borlet, Grand Rapids; George E. Parisho, Mississippi Valley; M. Lester Raynolds, Indianapolis, chairman; John J. Bunsic, Southern Tier; George W. Taylor, Southeastern; James E. Cogan Jr., Philadelphia. (2) Saturday morning technical session of the Fiftieth Anniversary Meeting of Philadelphia Branch. William K. Murray of Enthone, one of three speakers. (3) National President Ralph D. Wysong conducting the Seventh Interim Meeting. At the dais, l to r, Third Vice President Manuel Ben, Second Vice President Chester G. Borlet, First Vice President W. Andrew Wesley, President Wysong, National Executive Secretary John P. Nichols, Past President Herberth E. Head, Philadelphia Branch President James E. Cogan Jr. (4) A few of the Delegates and Alternates in session at the Seventh Interim Meeting of the Supreme Society. (5) Delegates and Alternates at lunch. (6) Frank O. Beuckman, Rochester Branch, rises to acknowledge candidacy for post of National Third Vice President. (7) Robert J. Girard, Springfield Branch, acknowledges his candidacy for the National Third Vice Presidency. (8 & 9) Two views of the Philadelphia Branch Fiftieth Anniversary Banquet which filled the Crystal Ballroom of the Benjamin Franklin Hotel. (10) Los Angeles Convention Chairman Tony Stabile, right, and his son John, at the banquet. (11) Banquet head table, l to r, Mrs. Frank Kaiser, National Executive Secretary John P. Nichols, Mrs. Nichols, Past President Herberth E. Head, First Vice President W. Andrew Wesley, Mrs. Wesley, Second Vice President Chester G. Borlet, President Ralph D. Wysong, Branch President James E. Cogan Jr., Mrs. Cogan, Third Vice President Manuel Ben, Mrs. Ben, Reverend Arthur C. Barnhard, Mrs. Couch. At the extreme ends of the dais, but not shown in the picture, left, Frank Kaiser, secretary-treasurer of the NAMF; and at right, Earle W. Couch, past president of the MFSA.

HOST: AES
PHILADELPHIA BRANCH

INTERIM MEETING REPORTER

BEN FRANKLIN HOTEL
PHILADELPHIA, PA.
FEBRUARY 20, 1960

RECORD INTERIM MEETING A FEATURE OF PHILADELPHIA BRANCH FIFTIETH ANNIVERSARY

A record-breaking 30 Branches of the American Electroplaters' Society's (AES) 58 American, Canadian and Australian Branches were represented at the SEVENTH INTERIM MEETING of the Supreme Society conducted in Philadelphia's Benjamin Franklin Hotel, Saturday, February 20, 1960, concurrently with the two-day FIFTIETH ANNIVERSARY observance of the AES Philadelphia Branch held in the same site, February 19–20, with Branch President James E. Cogan Jr. as General Chairman.

The Philadelpha Branch's two-day anniversary program not only included an outstanding two-session educational symposium featuring important technical and scientific papers by experts but also produced a Golden Jubilee Banquet, commemorative program, floor show and dance that broke all records of that historic AES Branch for quality and stature.

Other important AES meetings were conducted at the same locale on prior days, namely the all-day meeting of the AES Research Committee that occurred on Thursday, February 18—the all-day meeting of the AES Executive Board conducted Friday, February 19—and the joint meeting of the AES Executive Board and the Board of Trustees of the Metal Finishing Suppliers Association (MFSA) held Friday evening. MFSA also conducted a capital-grade cocktail party prior to the Golden Jubilee Banquet honoring the AES and its Philadelphia Branch's anniversary. The Membership Committee also held a breakfast meeting, Saturday morning, February 20, and the Educational Committee held a session Thursday evening, February 18.

DISTINGUISHED AUDIENCE AT OPENING SESSION

The Grand Opening Session of the Philadelphia Anniversary was held Friday evening with all National Officers of the AES present and with Branch President Cogan presiding. Following the invocation and the introduction of AES National and Branch Officers, distinguished guests and Committee Chairmen, the meeting heard the address of National President Wysong.

The first Educational Session immediately followed the Opening Session and featured technical talks by Dr. W. Andrew Wesley, International Nickel Company and John B. Winters, Incar, Inc. AES Past President Samuel Heiman presided.

ST. LOUIS FAVORED AS NEXT EXPOSITION SITE

Simultaneously, elsewhere, the AES Executive Board and the MFSA's trustees met in joint session. Apart from many other subjects discussed of mutual interest to AES and MFSA, the two bodies favorably considered St. Louis as a prime and preferred site for the next AES Industrial Finishing Exposition, and favorably regarded the three-day period of June 16–18, 1964 as Exposition dates. On the following day, the AES Executive Board, at its own meeting's continuance, unanimously adopted a resolution to recommend to the Supreme Society at the Annual Meeting in Los Angeles, July 28, 1960, that St. Louis be named as site of the AES's next Exposition and that it be held in the outstanding Keil Auditorium of that city, June 16–18, 1964.

Also announced at the joint AES-MFSA meeting Friday evening was the fact that an MFSA Ball would be conducted at the AES's 47th Annual Convention, Monday, July 25 instead of the buffet supper heretofore sponsored by MFSA at AES Conventions, and that the MFSA would also sponsor a Cocktail Party during the hour, at the Los Angeles Convention, preceding the gala Farewell Banquet, Thursday, July 28, 1960.

SEVENTH INTERIM MEETING COMPLETES MUCH BUSINESS

On Saturday forenoon, with the National President in the chair, the record-breaking SEVENTH INTERIM MEETING of the Supreme Society, AES's summit governing council, first heard all phases of AES's operation and scope discussed via a coordinated report each of whose six elements was covered by one of AES's six National Officers, namely President Wysong, First Vice President Wesley, Second Vice President Borlet, Third Vice President Ben, Past President Head and National Executive Secretary Nichols.

The Supreme Society also heard reports, and conducted discussion, on future AES Conventions and Interim Meetings. It received reports from respective Chairmen of AES Standing and Special Committees, including a report from the Executive Board itself concerning plans for reinvesting AES reserves resulting from a survey made by it as requested by the Supreme Society at its Detroit meeting, June 18, 1959.

Each of two AES Branches submitted invitation to the Supreme Society to name it convention site of the AES's 53rd Annual Convention to be held in 1966, namely the Buffalo and the Southeastern Branches. The Supreme Society will make a selection by poll at its July 28 meeting from among these and any other documented Branch invitations received by it by then.

The Dayton Branch invited the Supreme Society to grant it the 1963 Interim Meeting as a springboard for its own FIFTIETH ANNIVERSARY. The governing council will act upon this invitation and all others received for the 1962 or 1963 Interim Meetings by July 28. Meanwhile, it was announced by the Executive Board that the EIGHTH INTERIM MEETING will be held in Hartford, Connecticut, February 11, 1961, with the New England Regional Council as host and Allen Ferguson and Richard C. Barrett as Co-Chairmen.

The respective candidacies of Frank H. Beuckman of the Rochester Branch and Robert Girard of the Springfield Branch for Third Vice President were announced at the Interim Meeting by O. Bert Kirchoff of the Buffalo Branch and Manson Glover of the Boston Branch respectively. Mr. Beuckman was further endorsed by Louis V. Gagnon of the Boston Branch—and Mr. Girard was further supported by Ralph M. McCahan of the Hartford Branch.

A "sense of the meeting" resolution to the effect that "conflict of any other meeting with the Business Sessions of the Supreme Society be discouraged," offered by AES Past President William J. Neill, was unanimously adopted. Mr. Neill also announced for the Order of Past Presidents, the creation of a "Past President's Award" in the form of a scroll to be awarded annually by that body to that AES member whose performance for the AES is adjudged best by that body of AES heads of the past. Reportedly, the Award will be given for the first time at Los Angeles in July.

A resolution offered by Law Committee Chairman Manson Glover congratulating the Philadelphia Branch upon its FIFTIETH ANNIVERSARY and extending Supreme Society commendation and thanks to it for the quality of its handling of arrangements of the SEVENTH INTERIM MEETING was also unanimously adopted.

ANNIVERSARY ENDS WITH GALA BANQUET

Held Saturday forenoon, the second educational session featured a symposium on Aluminum Finishing in which Dr. Harold J. Wiesner, Bendix Aviation

(*Continued on page 418*)

INCO SPONSORS AES PRECIOUS METAL PLATING PAPER AWARD

Effective immediately, the annual award for the best paper on the plating of platinum, palladium, rhodium, iridium, ruthenium, gold or silver appearing in PLATING MAGAZINE or TECHNICAL PROCEEDINGS during the fiscal year will be known as the "Precious Metal Plating Award of American Electroplaters' Society" and will be sponsored by the International Nickel Company. Action to this effect was taken by the AES's Executive Board at its Philadelphia meeting, February 19.

With the winner to be chosen annually by the Society's Paper Awards Selection Committee on the basis of the rules and regulations governing all AES Paper Awards spread in the Appendix of the Society's Constitution and Bylaw booklet, the new Award will consist of a $50 cash prize, a handsome certificate, and suitable recognition in PLATING and TECHNICAL PROCEEDINGS.

FIVE MAJOR AES EDUCATIONAL MEETINGS TO FEATURE BUSY APRIL

In Aprils gone by, Rome was founded, Shakespeare died, the shot "heard round the world" was fired in Concord town, and they laid the martyr's crown on Abraham Lincoln's brow. In April 1960, American Electroplaters' Society (AES) will conduct one of the largest monthfuls of educational meetings beneficial to its members in AES's five-decade history.

On Saturday, April 9, the Baltimore-Washington Branch will not only stage its Annual Educational Sessions but also its Annual Banquet and Dance at which the Branch's traditional presentation of the "pot" of the Order of Past Presidents will be made to the AES National President. The event will take place at the Park Plaza Hotel in Baltimore.

The Twenty-First Annual New England Regional Meeting will occur at the Statler Hotel in Hartford, Connecticut, Saturday, April 23, with the Bridgeport Branch as Host and Allen Ferguson, Bridgeport's head, as General Chairman. And in Cincinnati that day, the Sixth Tri-State Regional Meeting will take place at AES's familiar Sheraton-Gibson Hotel, with the Cincinnati Branch as Host and Lee Howald as General Chairman. The Editorial Board will meet in Cincinnati the prior day. National Officers will be present at both regionals—Messrs. Wysong, Head, Borlet and Nichols at Cincinnati—Messrs. Wesley and Ben in Hartford.

A week later, the Sixth Empire State Regional will be staged at the Mark Twain Hotel, Elmira, New York, with the Southern Tier Branch as Host. And that same Saturday, the Milwaukee Branch's Annual Educational Sessions, Banquet and Dance will take place at the Schroeder Hotel, with added attraction being the organization meeting of the Midwest Regional Council's 1962 National Convention Committee under the leadership of General Convention Chairman Herman A. Tessmann of Milwaukee, Host Branch. National Officers Wesley, Borlet, Ben and Nichols will be at the Empire State Regional—President Wysong and Past President Head will be in Milwaukee.

Frank O. Beuckman

Robert J. Girard

TWO CANDIDATES FOR AES NATIONAL OFFICE ANNOUNCED AT SEVENTH INTERIM MEETING

At the Seventh Interim Meeting of the Supreme Society held in Philadelphia, February 20, the intention of two AES stalwarts to vie for election to the AES Third Vice Presidency at the Annual Meeting of the Supreme Society to be held in Los Angeles, July 28, 1960, was announced. Sponsored by the Rochester Branch, Past Branch President Frank O. Beuckman (left above) is one—supported by the Springfield Branch, Past Branch President Robert Girard (right above) is the other. Reportedly, there is prospect of additional candidacies.

A graduate of the University of Rochester, Mr. Beuckman has been associated with the Eastman Kodak Company for some two decades. Additionally, he is an instructor in electroplating and metal finishing. His distinguished service to the AES includes substantial tenure as a Branch Delegate and Branch Officer. He is himself a recent winner of the AES's George B. Hogaboom Memorial Nickel Plating Award and is a Past Chairman of the Society's Paper Awards Committee. He is active in the leadership of the Empire State Regional Group.

Active for some years in the annual deliberations of the Supreme Society, Mr. Girard is associated with the Springfield Armory and is a former part-owner of a plating enterprise. He is a graduate of Syracuse University supplemented by post graduate education elsewhere. He has served the Springfield Branch notably for a number of years as Branch Officer and accredited Delegate. He is one of the sparkplugs of the AES's New England Regional Group.

RECORD INTERIM MEETING

(*Continued from page 417*)

Corporation, Russell V. Vanden Berg of Aluminum Company of America and William K. Murray of Enthone, Inc. participated. The gala MFSA Cocktail Hour, followed by the Farewell Banquet, concluded that eventful day.

With the AES's massive ceremonial banner backdropping the dais, and the Ben Franklin Hotel's Crystal Ballroom packed to capacity, the Philadelphia Branch's half-century birthday party reached its climax with a banquet that will long be remembered by those who attended it. Branch President Cogan served as Master of Ceremonies.

The invocation was given by the Reverend Arthur C. Barnhard. Then followed the Anniversary Address of National President Wysong. Each Committee Chairman was introduced and congratulated. A floor show followed. Then Philadelphia and its guests danced till the early morning hours to the tuneful music of Tony Desmond and his orchestra. And after the band played its last, the Philadelphia Branch Anniversary passed into AES posterity.

"PAST PRESIDENTS' AWARD" CREATED

At the Seventh Interim Meeting of the Supreme Society, it was announced by the Order of Past Presidents that a new Award had been created by that body of Past AES National Presidents titled "Past Presidents' Award". Consisting of a scroll, that Award will annually be given by the Order, starting at the Los Angeles Convention, to that AES member adjudged by it as most worthy of such recognition by the quality of his service to AES during the fiscal year.

Another Award identified with the Order, is the "Pot" annually given to the retiring AES National President by the Baltimore-Washington Branch at a traditional Branch ceremony. This year's edition will be held in Baltimore, April 9.

In Memoriam

WILLIAM J. SCHNEIDER

The American Electroplaters' Society's (AES) five living Founding Fathers became four on March 1, 1960 with the death that day of William J. Schneider, 73, a member for over a half century, of the AES's New York Branch.

Mr. Schneider, a resident with his family at 1530 E. 19th Street, Brooklyn, New York, was associated with electroplating and metal finishing from its earliest day. While active, he was connected for some 38 years with E. I. Dupont de Nemours & Co. He retired in 1951.

The deceased was prominent in the formation of the National Electro-Platers Association of the United States and Canada (NEPA) in 1909 which was transformed into AES in 1913. In fact, he was elected a member of NEPA's very first Advisory Board. He has been active in the Mother Branch's affairs and activities until relatively recently, and was one of that Branch's three living Founding Fathers who were honored at its memorable GOLDEN JUBILEE COMMEMORATIVE in February 1959.

He is survived by his wife, Dora; a daughter, Gertrude; son, Murray and two grandchildren. The Society, its PLATING MAGAZINE and especially AES's New York Branch mourn his loss.

Henry B. Linford

Leslie L. Diveley

William M. Tucker

AES 1959 - 1960 AWARDS BEING FINALIZED FOR ANNOUNCEMENT

Two among the Branch candidates for AES Honorary Membership were endorsed by the Honorary Membership Awards Committee headed by Leslie L. Diveley of the Milwaukee Branch, and the Executive Board, at its Philadelphia Meeting, February 19, ratified both selections. Consequently, both names will be nominated at the Supreme Society's Annual Meeting, Los Angeles, July 28 for election by that summit governing council. The Committee includes, besides its Chairman, Messrs. Samuel Heiman (Philadelphia), Anthony P. Julius (St. Louis) and Charles C. Conley (Cleveland).

The selections by the Paper Awards Committee of winners of the Society's eight Paper Awards for 1959–1960 will be announced at the First Business Session of the Supreme Society at the Los Angeles Convention. The Committee is headed by William M. Tucker and includes Dr. Henry Brown and Clarence H. Sample.

The choice of the third annual winner of the AES's Scientific Achievement Award, the Society's highest scientific honor, will be announced at the Grand Opening Session of the Los Angeles Convention, Monday, July 25. The Committee is led by Dr. Henry B. Linford and includes Myron B. Diggin and Drs. Abner Brenner, Russel E. Harr, Louis Weisberg and Harold J. Wiesner.

The first winner of the Charles Henry Proctor Memorial Leadership Award will be announced at the Farewell Banquet of the Los Angeles Convention. The Selection Committee includes the donors, namely Mr. and Mrs. William O. Preston, son-in-law and daughter respectively of the late C. H. Proctor, Founder of AES.

FORMS NEEDED FROM YOU IN CALIFORNIA

A Hotel Reservation Form, together with other informative items concerning the AES's 47th Annual Convention to be held at the Statler Hotel, Los Angeles, California, July 24–28, 1960, were mailed by National Headquarters in early February in behalf of the Host Branch Convention Committee, headed by General Chairman Tony Stabile, to each AES Active, Student, Honorary and Sustaining Member and Member-at-Large, wherever domiciled.

Because of the importance of getting each member's Hotel Reservation Form on its way to Los Angeles for earliest possible processing, another copy is being carried in this issue of PLATING MAGAZINE for the benefit of any members needing or desiring extra copies.

A return card, moreover, was included in that same mail intended to be filled out immediately by parents taking children to the Convention. The Children's Program Committee urgently needs the data sought in those cards so as to include effective arrangements for children. If you have not yet filled out and returned YOURS, your delay is harassing the Committee's effort to finalize a program of importance to YOU and OTHER members. Mail it today, please.

AES THANKS . . .

On the heels of the $100 special contribution recently made to the AES Research Program by the Society's Detroit Branch, the AES Toronto Branch has just donated $200 to the Research Program.

Aside from these special Branch contributions, the American Society for Testing Materials (ASTM) is a 1959–1960 contributor to the AES Research Program having donated $500 earlier in the current fiscal year, for the third annual time.

AES heartily thanks all of these contributors to its important research program targeted toward specific advancements in plating and metal finishing.

NORRIS POULSON
MAYOR

OFFICE OF THE MAYOR
CITY HALL
LOS ANGELES 12, CALIFORNIA

PROCLAMATION

TO THE CITIZENS OF LOS ANGELES, GREETINGS:

WHEREAS, Los Angeles will be the site this year of the Annual Convention of the American Electroplaters' Society, Inc., and

WHEREAS, the Los Angeles branch of this organization is more than 30 years old, indicating that this city is a leader not only in the electroplating industry but also in its scientific organizations and advancement, and

WHEREAS, electroplating is an industry which treats materials used by everyone in his home and business;

NOW, THEREFORE, as Mayor of the City of Los Angeles, I proclaim the week of July 24-28, 1960, as AMERICAN ELECTROPLATERS' SOCIETY WEEK and I call upon all citizens to familiarize themselves with this important organization and its contributions to better living.

Norris Poulson
MAYOR

"AMERICAN ELECTROPLATERS' SOCIETY WEEK" PROCLAIMED BY LOS ANGELES MAYOR

The week of July 25–28, 1960 has been proclaimed "American Electroplaters' Society Week in Los Angeles" by Mayor Norris Poulson—and, expectedly, he himself will be present at the Grand Opening Session of the AES's 47th Annual Convention, Statler Hotel, July 25, to welcome the AES family to the "Wonder City". Mayor Poulson's Proclamation as promulgated is spread in full on the facing page.

What will it mean to the AES member to be in Los Angeles during "American Electroplaters' Society Week"?

THE WEEK'S MEANING TO THE AES MEMBER

Foremost for the AES member, it will mean education in the arts and sciences of electroplating, metal finishing and allied arts through an Educational Sessions Program embodying 32 papers grouped into nine sessions plus, of course, the second annual "William Blum Lecture", this year to be delivered by Dr. A. Kenneth Graham, second winner of the "AES Scientific Achievement Award", the Society's highest scientific honor. The 32 papers will include eight on hydrogen embrittlement in metal finishing to be delivered as elements of the Symposium on that subject eagerly awaited by the Society. They will include, too, a session on organic finishing. Discussion will attend the delivery of each paper, and there will also be an open forum on hydrogen embrittlement.

AND TO THE MEMBER'S LADY

For the AES member's lady, there will be a four-day span of events from which choice female memories will be made. That dreamed-of opportunity will materialize to view the habitat of the silver screen's luminaries—to be part of the Hollywood scene however briefly—to see "Sunset Strip" and "Hollywood and Vine"—to examine the foottracks of the celebrated artists and artistes of several decades imbedded in the sidewalk of Grauman's famed Chinese Theatre—to caper in renowned Farmers Market. There will be teas—and aqua-poolside luncheons—and diving exhibitions—and California fashion shows—and, in the balmy California evenings, there will be dancing—and a floor show—and, finally, a Farewell Banquet starring California-grade entertainment.

AND TO HIS OFFSPRING

For the AES member's offspring, "American Electroplaters' Society Week in Los Angeles" will mean day-long furloughs from parental apron strings to live youthful dreams of Western derring-do. Under kindly but firm supervision of qualified counsellors, AES's juniors will probably thrill to the sights at Marineland—at Knott's Berry Farm. They, too, will view the "Homes of the Stars" from a comfortable bus, and may even see a motion picture in production in Hollywood. They may be taken either to the ranch of "Crash" Corrigan or to the spread of Gene Autry. When the Children's Program has been finalized, with the youngsters' tastes foremost in mind, they should surely like the result.

OPPORTUNITY THAT MAY KNOCK BUT ONCE

For the AES member's family as a group, there will be the eventful Tuesday's family journey to Disneyland. And on Monday evening, there will be an innovation.

Instead of the Open House sponsored annually by the Metal Finishing Supplier's Association (MFSA) on the Monday evening of the AES Convention, the MFSA, this year, will sponsor a Dancing Party that same evening with two top-flight orchestras providing the Ball's continuous music. The MFSA, in addition, will stage a gala cocktail party during the hour preceding the Farewell Banquet.

NORRIS POULSON
Mayor of Los Angeles

The Banquet's entertainment feature will be "Manny Harmon's Revue in Glamour".

For male and female adults, this year's Convention Registration Fee will be $25 each. The Children's Fee will be $18 each but will not include a banquet ticket. These, however, may be purchased separately.

And so the stage is rapidly being set for "American Electroplaters' Society Week in Los Angeles". Opportunity to combine Convention benefits with California vacation is thus knocking at the door of every AES member. "I knock unbidden once", wrote the famed John James Ingalls about opportunity. "If sleeping, wake; if feasting, rise before I turn away. It is the hour of fate."

Featured at the Los Angeles Convention Banquet will be Manny Harmon with his renowned orchestra and soloists.

47th ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, Inc.
STATLER HOTEL, LOS ANGELES, CALIFORNIA
JULY 24-28, 1960

TENTATIVE PROGRAM

This is a TENTATIVE PROGRAM as of March 9, 1960. Additions and modifications will be made monthly until finalized.

SUNDAY, JULY 24

9:00 a. m.	Executive Board Meeting (All Day)	Dallas Room (Hq. Room)
2:00 p. m.	Honorary Membershio Award Committee Meeting	Washington Room
2:00 p. m.	Scientific Achievement Award Committee Meeting	St. Louis Room
3:00 p. m.	Ladies Program. California Welcome Tea	Garden Room
4:00 p. m.	Credentials Committee Meeting with Executive Board	Dallas Room
8:00 p. m.	Get-Together Party	Golden State Room

MONDAY, JULY 25

9:00 a. m.	Children's Program—Supervised Visit to Marineland and Knott's Berry Farm (subject to change)	(Bus time to be Announced)
10:00 a. m.	Grand Opening Session	Golden State Room
11:00 a. m.	Business Meeting, Supreme Society	Golden State Room
12:00 noon	Branch Secretaries' Luncheon	New York Room
12:00 noon	Ladies Program. Luncheon and Entertainment	Pacific Room
12:15 p. m.	Speakers' Luncheon	Cleveland Room
2:00 p. m.	Educational Opening Session Second Annual "William Blum Lecture" (Dr. A. Kenneth Graham, Second Winner, "AES Scientific Achievement Award".)	Golden State Room
2:00 p. m.	Plant Inspection Trip	(To be Announced)
2:30 p. m.	Editorial Board Meeting	Boston Room
2:30 p. m.	Midwest Regional Council Meeting	Dallas Room
2:30 p. m.	Educational Session A "Applying Statistical Quality Control to Plating Processes" "Chemical Milling" "Hazards in the Plating Room"	Golden State Room
2:30 p. m.	Educational Session B "Adhesion of Organic Enamels to Electrodeposited Nickel" "Solid Film Lubricants as Organic Finishes" "Magnesium Corrosion"	West Garden Room
4:00 p. m.	Order of Past Presidents' Business Meeting	Detroit Room
6:30 p. m.	Order of Past Presidents' Dinner	Washington Room
8:00 p. m.	Convention Ball (Sponsored by Metal Finishing Suppliers' Association—Admittance by Registration Badge)	Pacific & Sierra Rooms

TUESDAY, JULY 26

8:00 a. m.	Charles Henry Proctor Memorial Leadership Award Selection Committee Breakfast	Boston Room
8:00 a. m.	Speakers' Breakfast	Cleveland Room
8:30 a. m.	Golf Tournament (Sponsored by MFSA)	Los Coyotes Country Club, Buena Park
9:00 a. m.	Membership Committee Meeting	Washington Room
9:00 a. m.	Public Relations Committee Meeting	Detroit Room
9:00 a. m.	Southwestern Regional Council—Organization Meeting	Dallas Room
9:00 a. m.	Educational Session C "Recent Developments in Gold Electroplating" "A Cyanide Bath for Heavy Gold Plating" "Acid Gold Plating" "Precious Metal Plating and Printed Circuits"	Golden State Room
9:00 a. m.	Educational Session D "Outdoor, Accelerated and Galvanic Test Results on Nickel-Chromium Deposits" "A Progress Report on Experiences in Improving the Corrosion Resistance of Automotive Parts" "New Data on the Performance of Nickel and Chromium Plated Zinc Die Castings" "A Study of Variations in Certain Characteristics of Bright Nickel Deposits with Variations in Bath Temperature"	West Garden Room
2:30 p. m.	Annual Outing (Busses leave Statler Hotel)	Disneyland

WEDNESDAY, JULY 27

8:00 a. m. **Research Committee Breakfast** ..... **Cleveland Room**

8:00 a. m. **Speakers' Breakfast** ..... **Buffalo Room**

9:00 a. m. **Educational Session E—"Hydrogen Embrittlement in Metal Finishing"**
Symposium ..... **Golden State Room**
"The Metallurgical Aspects of Hydrogen Embrittlement in Metal Finishing"
"On the Mechanism of Transport of Hydrogen across a Metal Interface"
"The Behavior of Hydrogen in Iron and Steel"
"Detection and Control of Chemisorbed Hydrogen during Electrolysis"

9:00 a. m. **Research Committee Meeting** ..... **Detroit Room**

9:00 a. m. **Publications Committee Meeting** ..... **Boston Room**

9:00 a. m. **Educational Committee Meeting** ..... **Washington Room**

9:00 a. m. **Children's Program—Supervised bus view of "Homes of the Stars" and guided tour, motion picture studio (subject to change)** ..... **(Bus time to be Announced)**

12:00 noon **Joint Educational Committee and Branch Librarians' Luncheon** ..... **New York Room**

12:00 noon **Speakers' Luncheon** ..... **Buffalo Room**

12:30 p. m. **Ladies' Program "Luncheon Around the Aqua Pool" and California Fashion Show** ..... **Beverly Hilton Hotel**

2:00 p. m. **Research Committee Meeting** ..... **Detroit Room**

2:00 p. m. **Educational Session F—"Hydrogen Embrittlement in Metal Finishing"**
Symposium ..... **Golden State Room**
"Measurements Pertaining to Hydrogen Embrittlement"
"A New Look at the Hydrogen Embrittlement of Cadmium Coated High Strength Steels"
"Effectiveness of Metallic Undercoats in Minimizing Plating Embrittlement of Ultra High Strength Steels"
"Control of Hydrogen Embrittlement by Plating from Cadmium Cyanide Baths Containing Nitrate"

7:30 p. m. **Round Table Discussion on "Hydrogen Embrittlement in Metal Finishing"** ..... **Los Angeles Room**

9:30 p. m. **Floor Show and Dance** ..... **Pacific & Sierra Rooms**

THURSDAY, JULY 28

8:00 a. m. **Speakers' Breakfast** ..... **St. Louis Room**

9:00 a. m. **Ladies' Program. TV Show and Breakfast in Hollywood** ..... **(Bus time to be Announced)**

9:00 a. m. **Business Meeting, Supreme Society** ..... **Sierra Room**

9:00 a. m. **Educational Session G** ..... **Golden State Room**
"Magnetic Properties of Electrodeposited Cobalt Alloys"
"Plating of Nickel, Cobalt, Iron and Cadmium from Sulfamate Solutions"
"The Chemical Reduction of Nickel-Phosphorus Alloys from Pyrophosphate Solutions"

9:00 a. m. **Educational Session H** ..... **West Garden Room**
"Cleaning Techniques in the Electronics Industry"
"Solution Transfer in Barrel Plating"
"Chromium Plating of Rifle Barrels"

9:00 a. m. **Children's Program—Supervised visit of Corriganville or Gene Autry Ranch (Subject to change)** ..... **(Bus time to be Announced)**

9:30 a. m. **Plant Inspection Trip** ..... **(To be Announced)**

11:00 a. m. **Ladies' Program. Bus View of "Homes of the Stars"** ..... **(Bus time to be Announced)**

12:30 p. m. **Ladies' Luncheon (Dutch Treat) and Shopping, Farmer's Market** ..... **Farmer's Market**

1:00 p. m. **Plant Inspection Trip** ..... **(To be Announced)**

2:00 p. m. **Business Meeting, Supreme Society** ..... **Sierra Room**

2:00 p. m. **Educational Session I** ..... **Golden State Room**
"AES Research and Its Seven Active Projects" by Research Committee Chairman James D. Thomas
"New Methods of Chromium Plating Directly on Aluminum"
"Corrosion Protection with Decorative Chromium"
"Experience in the Operation and Performance of Dual Chromium Systems"

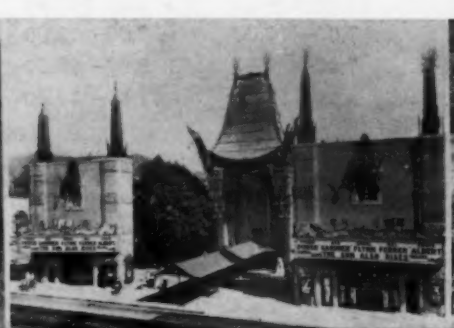
6:00 p. m. **Cocktail Party (Sponsored by Metal Finishing Suppliers' Association** ..... **Wilshire Room**

7:00 p. m. **Annual Banquet and Dance** ..... **Pacific & Sierra Rooms**

FRIDAY, JULY 29

8:00 a. m. **President's Breakfast to National Officers & Families** ..... **AES Executive Suite**

9:00 a. m. **Executive Board Meeting** ..... **Dallas Room**



Hotel Reservation Request

American Electroplaters' Society

Los Angeles, California—July 24-28, 1960

MISS NINA L. McGOVERN
HOUSING COMMITTEE, A.E.S.
LOS ANGELES CONVENTION BUREAU, INC.
404 SOUTH BIXEL STREET, LOS ANGELES 54, CALIFORNIA

AES Member?_____
YES OR NO

(Please print or type)

1st CHOICE: HOTEL_____ 3rd CHOICE: HOTEL_____

2nd CHOICE: HOTEL_____ 4th CHOICE: HOTEL_____

ACCOMMODATIONS DESIRED:	RATE DESIRED:
_____ Room(s) with one bed for one person (Single)	$_____ to $_____
_____ Room(s) with twin beds for two persons (Twin)	$_____ to $_____
_____ Room(s) with one bed for two persons (Double)	$_____ to $_____
_____ Suite(s) parlor and one bedroom	$_____ to $_____
_____ Suite(s) parlor and two bedrooms	$_____ to $_____

ARRIVAL TIME: Date_____ Hour_____ DEPARTURE TIME: Date_____ Hour_____

LIST NAMES OF ALL PERSONS WHO WILL OCCUPY EACH ROOM:

Name	Street Address	City and State

CONFIRM RESERVATION TO: Name_____

Company_____

Street Address_____

City_____ Zone_____ State_____

LOS ANGELES CONVENTION HOTELS (Daily Rates, Subject to Change)

	Singles	Doubles	Twins	Suites
Statler Hilton (Headquarters)	$8.00–$14.50	$11.50–$17.00	$12.00–$18.50	$23.00–UP
Mayfair	7.00– 10.00	9.00– 13.00	10.50– 13.00	22.00–34.00
Commodore	5.00– 9.00	8.00– 12.00	8.00– 12.00	14.00–35.00
Biltmore	8.00– 15.00	11.50– 17.00	12.50– 18.50	20.00–50.00

Please give ALL of the information requested and mail this form to the Los Angeles Convention and Tourist Bureau. All reservations must be cleared through the Housing Committee.
Blocks of rooms have been allocated for our use in the hotels listed. The Housing Committee must have the names of all persons who will occupy each room. No block reservations will be made.

Placement will be made in the order received. Your choice of hotels will be followed if rooms are available. Otherwise, assignment will be made to best possible advantage elsewhere. You will receive a confirmation directly from the hotel. If you desire accommodations in a Los Angeles hotel not listed, please so indicate.

IF YOU HAVE NOT ALREADY MADE YOUR HOTEL RESERVATIONS, FILL OUT AND MAIL PROMPTLY

EMPIRE STATE REGION IN IMPORTANT TWO-DAY ELMIRA, NEW YORK MEETING

With the AES's Southern Tier Branch as Host, the Sixth Empire State Regional meeting of American Electroplaters' Society, Inc. will be held at the Mark Twain Hotel, Elmira, New York, April 29–30, 1960. Stanley Stefanski of that Branch is General Chairman.

Foremost attraction will be a two-day educational program featuring three organic papers to be delivered there by experts. M. W. Westgate, Gardner Laboratory, Inc. will discuss "Review of Testing Techniques in the Paint, Varnish and Lacquer Industry"; J. D. MacQueen, International Business Machines Corporation will treat "Vinyls and Their Uses" and E. C. Miller, Ransburg Electro-Coating Corporation will develop "Electrostatic Coating".

J. F. Jumer, Electro-Glo Company will present "Electropolishing of Metals"; Richard C. Barrett of the Barrett Chemical Company will cover "Sulfamate Nickel Process" and Dr. Edward B. Saubestre, Enthone Corporation will discuss "Printed Circuits".

Aside from the educational features of the meeting, a program of entertainment has also been planned by the Host Branch Committee. On Friday evening, there will be an old-fashioned round and square dance, in barn dance costumes, with prizes to be awarded. In addition, there will be a golf tournament Saturday morning at the Elmira Country Club with golfers vying for trophies to be provided by the Outing Committee.

The meeting will be climaxed by a Banquet. Entertainment will be by the Elmira Women's College Chorus. There will be Door and other Prizes. Dancing will follow to the early Sunday morning hours. Concurrently with the Sixth Empire State Regional meeting, the AES National Research Committee will conduct a two-day session at the Mark Twain Hotel, April 28–29.

Dr. Abner Brenner | R. L. Giesel | J. D. Thomas | G. E. Barnes

TWO TECHNICAL SESSIONS INNOVATION AT CINCINNATI TRI-STATE REGIONAL MEETING

The Sixth Annual Tri-State Meeting which will be held at the Sheraton-Gibson Hotel in Cincinnati, on April 23, for the first time will have both morning and afternoon technical sessions.

David L. Kaplan, Electric Auto-Lite Company, is chairman of the educational sessions. AES National President Ralph D. Wysong, Studebaker-Packard Corporation, will be Honorary Chairman.

"Personnel in Plating" by Robert L. Giesel, president, Adolph Plating, Inc., Chicago, will be the first paper followed by "Corrosion Resistance of Decorative Plates" by James D. Thomas, General Motors Research Laboratories, Detroit.

In the afternoon, "Waste Disposal" will be presented by George E. Barnes, Case Institute of Technology. "The Harperizer —A New and Fresh Approach to Problems of Mechanical Finishing" is the subject to be discussed by John F. Harper, president, Harper Buffing Machine Co. In an illustrated talk entitled "A Visit to Moscow," Dr. Abner Brenner, chief of the Electrodeposition Section, National Bureau of Standards, Washington, D. C., will describe his visit to the Soviet Union where he attended the Conference on Protection and Corrosion of Metals.

The Tri-State Region of the AES includes the Cincinnati, Dayton, Indianapolis, Louisville and Columbus Branches.

Another innovation at this year's Tri-State meeting will be a special reduced registration fee ($3.00 per person) for those who wish to attend educational sessions only. The regular registration fee ($9.50 per person) includes everything—educational sessions, banquet and dance. Tickets may be obtained from Richard K. Evans, Bill Young & Co., Inc., 1843 N. Reading Road, Cincinnati 15, Ohio.

BRIDGEPORT HOST BRANCH FOR NEW ENGLAND REGIONAL

The AES Twenty-First Annual New England Regional Meeting and Banquet will be held at the Hotel Statler Hilton, Hartford, Conn. Saturday, April 23, is the date for the event. Bridgeport is the Host Branch.

Two papers will be presented at the Educational Meeting in the afternoon, arranged by the New Haven Branch. George O'Connor is the educational committee chairman. Jack Little of Incar, Inc., will talk on "Modern Trends in Nickel Plating" which will include discussion of the recently introduced duplex nickel systems. Frank Papcsy of Western Electric Company will discuss "Precision Barrel Finishing." He has been engaged in this type of work for the last eight years.

The Educational Session is scheduled to start at three o'clock, and at the same time the ladies will be entertained with "bingo at its best." The ladies program has been arranged by Elery C. Gibson and Mrs. Alexander R. Salmond, chairman and chairlady. Bob Boulay will be master of ceremonies at the bingo.

At five o'clock, the ladies will join the men in the main ballroom for cocktails. Dinner will start at seven o'clock for the New Englanders and their visiting friends. Bill Glenny's Orchestra will play for dancing until 1:00 a.m.

The Bridgeport, Hartford, New Haven, Springfield and Waterbury Branches comprise the New England Regional.

In Memoriam

ARMAND W. FAUCHER

American Electroplaters' Society and its Hartford Branch have been saddened by the death on Friday, March 4, of Armand W. Faucher, 44 years of age, president of that Branch. The funeral was held on March 7 in Hartford. The Branch paid its respects in a body. Pallbearers were AES Past President Arthur W. Logozzo, representing the Society; Harry Sanders, representing the Hartford Branch and Harold Mitchel, Joseph McInerney, William Jones and Donald Genme, his fellow workers at the Chemical Corporation and fellow AES members.

The deceased started plating at the Underwood Corporation in Hartford in 1933. From a tank man, he advanced himself by self-study to a position with the Underwood Research Laboratory, remaining in that position from 1939 to 1954 when he became Plating Research Chemist with the Royal Typewriter Company. From there, he became Service Engineer of the Chemical Corporation in Springfield, Massachusetts until his demise.

Mr. Faucher, a member of AES for over 20 years has a distinguished record of Society service. Aside from his activities in the Hartford Branch, he was among the leaders of the Society's New England Regional Group. A portion of the March meeting of the Hartford Branch was devoted to an eulogy of the deceased. He is survived by four sons.

INTERSOCIETY NEWS

SPE CONFERENCE DATES ANNOUNCED

George W. Martin, president of the Society of Plastics Engineers, has announced the schedule of the Society's Regional Technical Conferences for 1960. These technical meetings are in addition to the monthly meetings of the society's 44 geographic sections. On April 20, "Plastics in the Petroleum and Chemical Industires" will be held at the Hotel Texas, Ft. Worth, Texas. Sponsored by the North Texas Section. September 8 and 9, "Vinyl Plastics and Plastics in the Shoe Industry" will be the subject of the conference at the Statler-Hilton, Boston, Mass. Sponsored by the Eastern New England Section. On September 22, "Plastics in Business Machines," at the Sheraton Inn, Binghamton, N. Y. Sponsored by the Binghamton Section. "Tooling for the Plastics Industry" is the October 10 meeting at the Hotel Commodore, New York, N. Y. Sponsored by the New York Section.

On November 7, "Automation in Injection and Compression Molding" will be discussed at Toronto, Ontario, Canada. Sponsored by the Ontario Section. "Blow-Molding" is to be the conference subject on November 18 at The Essex House, Newark, N. J. Sponsored by the Newark Section.

ASTME SEMINAR IN MOTOR CITY

New measuring concepts employed in tooling and manufacturing will be analyzed and evaluated at the American Society of Tool and Manufacturing Engineers' seminar on Dimensional Metrology, April 21 to 22, at the Sheraton-Cadillac Hotel in Detroit. The seminar is being held during ASTME's 1960 Engineering Conference and Exhibit, April 21 to 28, in the Motor City.

Included in the two day session will be an opportunity to participate in some of the events planned for the Engineering Conference. Participants will attend the Michigan Day Luncheon at the Artillery Armory, where the Tool Show will be held. Dr. Abe Silverstein, director, Office of Space Flight Development, National Aeronautics and Space Administration, will speak at the luncheon.

Also scheduled in the seminar program is the ASTME Industrial Progress Dinner, Friday, April 22. Rudolph F. Bannow, president, National Association of Manufacturers, will give the keynote address at this affair.

ELECTROCHEMICAL SOCIETY TO MEET IN CHICAGO

The Electrochemical Society, Inc. will hold its 117th Meeting at the LaSalle Hotel, Chicago, Ill,. from May 1 through 5, 1960.

Five Divisions of the Society will hold technical sessions at the meeting: The Theoretical Electrochemistry Division and the Industrial Electrolytic Division have scheduled a joint symposium on electrochemical engineering including applied electrode kinetics, transport processes in electrolytic cells, distribution of potential and current in electrolytic cells, and scale up and measurements on the plant scale.

The Theoretical Electrochemistry Division has scheduled two general sessions.

The Electric Insulation Division has scheduled a three-day symposium on electrolytic capacitors, as well as a general session. The Electronics Division has scheduled a general session, and six sessions on luminescence; the semiconductor group has symposia on: Crystal growth; physical chemistry of semiconductors; compound semiconductors, surfaces; oxide films; diffusion; and device technology.

The Electrothermics and Metallurgy Division has also scheduled a symposia. The Industrial Electrolytic Division has scheduled two general sessions.

MASTERS' ELECTRO-PLATING ANNUAL BANQUET ON MAY 14

The grand ballroom of the Hotel Plaza in New York City will again be the scene of one of the plating industry's most enjoyable social events on Saturday, May 14, namely the Forty-Second Annual Banquet of the Masters' Electro-Plating Association.

The Hotel Plaza, in its fountain plaza setting at the entrance to Central Park, is ideally suited to Masters' annual affair. Prior to the banquet, a reception and cocktail party will be given at 6:30 p.m. During the evening, the customary award will be made to the "Plating Man-of-the-Year" selected by the association. Entertainment and dancing will climax the evening.

Tickets are $25 per person and can be obtained from A. T. Marinaro, executive secretary of the association, 59 East Fourth Street, New York 3, N. Y.

NAMF CONVENTION PLANS ANNOUNCED

The National Association of Metal Finishers, will hold its annual meeting at the Statler-Hilton Hotel, Los Angeles, from Friday, July 22 to Monday, July 25, 1960.

The first session will be held Friday morning and will include the membership meeting and committee reports. An election of officers and directors' meeting will highlight the afternoon program. Local affiliate secretaries will meet in the evening.

NAMF's Saturday session will include the first management seminar in the morning, featuring Dr. Ted Anderson of UCLA who will discuss "Getting the Most Out of Job Shop Management." In the afternoon, Dr. Orlo Brees of the National Association of Manufacturers will talk on "Is It A Sin to Make a Fair Profit from Operating a Job Shop?"

The third and final management seminar on Saturday will be on costing methods. A panel of west coast platers will participate.

Saturday evening's program includes a cocktail hour and reception, followed by NAMF's banquet, special entertainment and dancing.

Monday's program includes a joint breakfast-meeting between NAMF directors and trustees of the Metal Finishing Suppliers' Association. Later, out-of-town platers will visit four local job shops —Crown City Plating, El Monte; Modern Plating, Los Angeles; Sanford Process, Los Angeles; and Burton Silver Plating, Culver City. Lunch at El Poches.

Host for the 1960 convention is the Metal Finishing Association of Southern California, NAMF affiliate. The convention committees: honorary chairman, A. T. Leonard, NAMF president, Superior Plating, Inc., Minneapolis; general chairman, H. E. Coombes Sr., Crown City Plating Co., El Monte; co-chairman, H. E. Coombes, Jr., Crown City Plating Co.; management seminars, J. Burton, Burton Silver Plating Co., Culver City; hotel, G. Irving, Specified Plating Co., Los Angeles; entertainment, B. J. Sherwood, Chemplate Corp., Los Angeles; plant tours, B. U. Smith, Metal Treaters, Inc., Inglewood; finance, W. P. Behlendorf, Spence Electro-Plating Co., Los Angeles; registration, F. O'Dell, Metal Surfaces, Inc., Huntington Park; public relations, P. E. Koecritz, L. A. Parkerizing Co., Los Angeles; and ladies' program, Mrs. B. Sherwood, Chemplate Corp., Los Angeles.

INDICATE A 424. ➤

LEA

ABRASIVE FINISHING METHODS

COPPER PLATE

ELECTRODEPOSITED COPPER

DIE CASTINGS • STAMPINGS • EXTRUSIONS • SPINNINGS • FORMINGS

Copper when electrodeposited in heavy films is most often used for protection of steel or zinc (die castings) against corrosion. Accordingly, the finish on the base metal is of secondary importance and frequently a fairly coarse polished surface is covered by a heavy deposit of copper of approximately .001" thick.

Generally, copper is used as an intermediate deposit to be followed by a nickel plate, which in turn is often followed by decorative chrome plate. If the final finish is a high color, the smooth, heavy copper deposit is **cut and color buffed with bar Grade 155 or ET60X LEAROK on a pocketed muslin buff at about 7000 sfm.** This may then be followed by a bright nickel plate and then directly to decorative chrome plating without further buffing. In other cases, the cut-down copper deposit is covered by a comparatively soft nickel deposit and the nickel **color buffed with bar 304-B or 309 LEAROK or lime finish on a loose muslin buff at about 7000 sfm.**

Where automated buffing is done liquid abrasive composition **LEA LIQUABRADE TH62M is recommended for heavy cut and color operation,** and **LEA LIQUABRADE SH33E for light cut and coloring.** Speeds of buffing wheels should be approximately 1000 sfm higher than those recommended for bar compositions.

This colored nickel surface produced with bar or liquid compositions is sufficient for a lustrous decorative chrome plate without further buffing.

When the final requirement is for a satin finish, the heavy copper deposit is first satin finished with either **"C" or "B" LEA COMPOUND on a loose muslin buff at about 5000 sfm.** The nickel is then deposited and, depending upon the thickness of the nickel deposit, a **medium or fine grade of LEA COMPOUND is used for satin finishing** the nickel surface. For a fairly heavy nickel deposit **Grade "C" LEA COMPOUND** is used on a **loose muslin buff at about 4500 sfm,** care being taken so that the lines from this operation are parallel to those produced on the copper plate beneath. With a thin nickel deposit, **Grade "R" or Grade "F" LEA COMPOUND** should be used instead on a **soft, packed muslin buff at about 4000 sfm,** again in the same direction as the satin finishing operation on the copper. Decorative chrome plate is then deposited on top of the satin nickel surface and if this is done properly, no further finishing is required. If the chrome bath is not functioning properly and the chrome deposit is foggy or milky, a light satin finishing operation is done on the chrome plate with **Grade "FG" LEA COMPOUND on a soft, packed muslin buff at about 3000 sfm.** Once again, the satin finishing operation should be done in the same direction as the previous ones.

. . . Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

The Hallmark of Quality Products

THE LEA MANUFACTURING CO.

16 CHERRY AVE., WATERBURY 20, CONN.

Lea-Michigan, Inc., 14459 Wildemere Ave., Detroit 38, Mich.
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, Derbyshire, England
Lea-Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Are you interested in plating specialties? SEE THE OTHER SIDE OF THIS INSERT

Tailored cyanide copper processes

...there's a specific Lea-Ronal copper process to meet your own exacting requirements

Over the years Lea-Ronal has gained world-wide recognition for its research on cyanide copper plating. From this research and development have come numerous processes, each with its own characteristics that make it outstanding for a specific type of operation. Every member of this Lea-Ronal family of Cyanide Copper Processes has been thoroughly production-tested and has been instrumental in improving the quality and production of the user's plating operation.

Any order for a Lea-Ronal Process carries with it plus values in experienced technical service and know-how.

for bright high speed copper

COPPER-GLO

For plating buffed zinc die castings or steel where maximum leveling or hiding is not a factor.

A full bright high speed cyanide copper that has become the industry standard. Through continued research this process has been constantly improved to give trouble free bright high speed operation.

for buffable copper

CUPRALL

A lustrous, ductile, buffable copper than can be plated at high speeds. Because of these characteristics and its exceptional tolerance to impurities, this bath has become the standard for such operations as bumper refinishing.

for hiding imperfections

Q-STRIKE

A cyanide copper strike developed to aid in "hiding" surface imperfections that are not covered by conventional strikes or bright copper processes. Will increase hiding and leveling when used as a strike prior to bright nickel.

for micro-leveling and lustre

Q-LEVEL

A new improved economical and simple cyanide copper process that offers a definite degree of leveling or hiding without employing current reversal cycles. Imperfections in castings can be partially or completely hidden (Leveling is achieved on surface roughness not exceeding 10 RMS).

for high rates of deposition plus micro-leveling

AIR-Q-LEVEL

A Q-Level Bath specifically designed for air agitation. Offers all the advantages of the Q-Level Process plus increased rates of deposition, and excellent metal distribution.

for leveling plus high rates of deposition

PR-Q-LEVEL

A Q-Level Bath designed to operate with Periodic Reverse. In addition to the high rates of deposition, macro-leveling as well as micro-leveling can be achieved. Process is simple, economical, completely stable with no deterioration of brighteners over prolonged operating periods.

The LEA GROUP
serving the Finishing Field
Lea-Ronal, Inc., Jamaica, N. Y.
Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co., of Canada, Ltd.
Lea Mfg. Co., of England, Ltd.
Plating Polishing Buffing Burring

Lea-Ronal Inc.

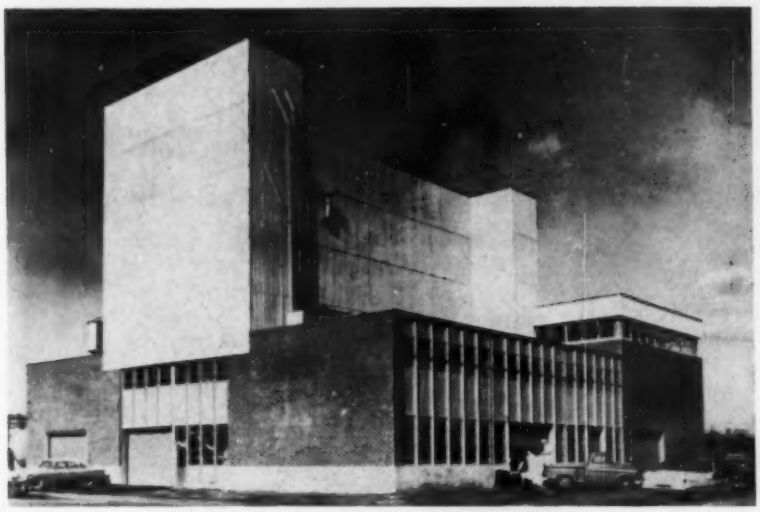
Sales and Manufacturing Plant:
237 East Aurora Street, Waterbury 20, Conn.
Main office and Laboratory:
139-20 109th Avenue, Jamaica 35, N. Y.

WRITE OR PHONE:
THE LEA MANUFACTURING CO. 16 CHERRY AVE., WATERBURY 20, CONN.
THROUGH WHOM THESE CYANIDE COPPER PROCESSES ARE EXCLUSIVELY MARKETED.

Note: The above Lea-Ronal Cyanide Copper Processes are covered by patents or pending patents.

Are you interested in Buffing, Polishing and Burring Specialties? **SEE OTHER SIDE OF THIS INSERT.**

INDUSTRY NEWS



Vitro Chemical is moving its nickel salts operation to the Chattanooga, Tennessee plant shown above.

VITRO CHEMICAL CONSOLIDATES OPERATIONS

Vitro Chemical Company plans to move its inorganic chemicals operation (including nickel salts) from Canonsburg, Pennsylvania to Chattanooga, Tennessee. This move, already under way, should be completed July 1.

Vitro Chemical Company presently produces rare earth and thorium chemicals, metals and alloys at the Chattanooga site. The similarity of the processes, the quality of the research staff and the modern manufacturing and laboratory facilities at Chattanooga it is believed will increase service to customers.

Vitro Chemical, a subsidiary of Vitro Corporation of America, was formed in October, 1959 as a result of a consolidation of several Vitro divisions, namely Vitro Rare Metals Co., Heavy Minerals Co., and Vitro Uranium. A small interest in the rare earth operations is held by Pechiney, the French chemical giant.

In addition to the Chattanooga and Canonsburg plant sites, Vitro Chemical Company mills uranium at Salt Lake City, Utah.

Although it is not to be in the immediate future, Vitro Chemical plans to expand its activities, possibly into organics. Work in these fields will come from internal research and mergers with other chemical concerns.

Last fall, Vitro Chemical joined the alloy field by commencing production of a thorium magnesium alloy. Research is also going on in the areas of rare earth alloys.

Previous to the set up, the sales of the Vitro chemicals divisions were handled by Berkshire Chemicals, Inc., in 1959 (a firm Vitro Corporation acquired in 1956) and their own sales staff prior to 1959.

A desire to expand sales effort necessitated the development of this new marketing set up, which has: 1) Increased the technical service group, 2) Increased its sales effort, 3) Increased its distributor organization, 4) Placed more emphasis on advertising, 5) Increased the role of its market research department, 6) Developed new packaging and a new trade mark.

BARRETT CHEMICAL MEXICO REPRESENTATIVES

The Barrett Chemical Products Co., Shelton, Conn., has announced the appointment of Enthone De Mexico, S.A., Ing. C. Torres McDonald, director, as manufacturers and exclusive representatives of its sulfamate nickel plating process in Mexico.

The process is a method of electrodepositing nickel having exceptionally low tensile stress.

Mr. Torres McDonald has had many years experience in the metal finishing field both in the United States and Mexico. He is a graduate of the School of Engineering at Texas A & M and founded the SMG (Sociedad Mexicana de Galvanoplastia), Mexico's counterpart of the AES.

SCHORE NAMED DISTRIBUTOR FOR BAKER BROTHERS

The Baker Brothers Company, Inc., of Canton, Massachusetts, has announced the appointment of George Schore Associates, Inc., of Westbury, New York as exclusive distributor of their equipment in the Metropolitan New York area.

Baker Brothers are rebuilders of used equipment and accessories to the metal finishing industry.

George Schore has had wide and varied experience as both technical and service engineer for the metal finishing industry. The full Baker Brothers line, including automatic plating and polishing equipment will now be available through Schore.

HULL EXPANDS DETROIT OFFICE

R. O. Hull & Company, Inc. has announced expansion of its Detroit Office at 3136 Hilton Rd., Ferndale, Michigan.

The new enlargement provides 50 per cent more warehouse space and additional laboratory facilities for greater service to customers.

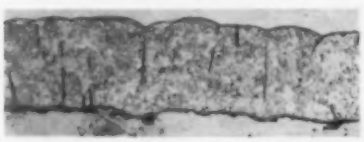
A new receiving dock will facilitate same day shipments to the eastern Michigan territory.

◀ INDICATE A 471.

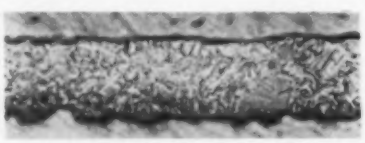
Call Du Pont: for better top-quality chemicals . . . timesaving

Now . . . you can deposit a level coat of copper on metal parts

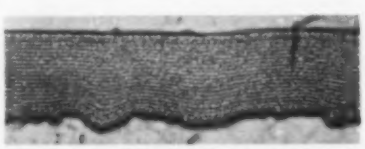
New process lowers finishing costs . . . improves appearance . . . provides an excellent undercoating for nickel and chromium.



1. Photomicrograph shows 0.001-inch copper plating on polished steel of 24 RMS. Conventional copper plating (above) shows uneven surface using direct current.



2. Du Pont's level-coating process with *interrupted current* shows amorphous structure and relatively level surface . . . satisfactory where maximum leveling is not required.

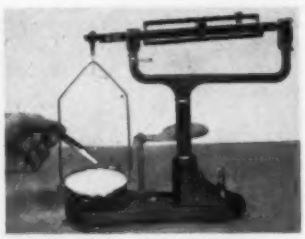


3. Same process with current reversal gives laminar structure, extremely level surface. *Current reversal* is employed where maximum leveling of surface is desired.

A combination of chemical additives and current variations form the basis of this new leveled copper plating method. Included are a high-efficiency cyanide copper bath and special Du Pont addition agents: Elchem 1396 and 1442M. The process can be easily and inexpensively adapted to most plating operations.

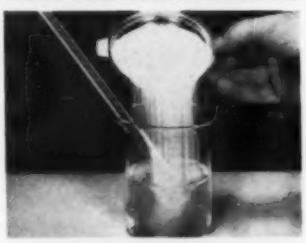
You'll avoid trouble and save time with new Du Pont double salts—

Sodium-Copper Cyanide and Potassium-Copper Cyanide



NEW DIRECT METHOD

1. You weigh required amount of Du Pont double salt instead of potassium or sodium cyanide *and* copper cyanide.



2. You dissolve double salt in water or plating solution. You eliminate steps of dissolving separate chemicals.

3. You add double salt directly to plating tank with no filtering necessary. Active ingredients are in proportions usually required. You save time, reduce handling, avoid waste and mixing errors.

The balanced composition of Du Pont double salts simplifies calculations required in making up new baths or replenishments. (1 oz. potassium-copper cyanide double salt equals 0.26 oz. copper, or 0.37 oz. copper cyanide; 1 oz. sodium-copper cyanide double salt equals 0.29 oz. copper or 0.41 oz. copper cyanide.) Both Du Pont double salts are packed in handy, moisture-resistant 100-lb. net fiber containers.

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electroplating at your plant... methods... dependable service

Two convenient forms of sodium cyanide 97%

ALL-PURPOSE CYANOBRIK®

—handy, pillow-shaped briquettes of 97% minimum sodium cyanide for all applications: plating, case hardening and chemical manufacture. Cuts inventory and purchasing problems. Made by a new Du Pont process, the briquettes are lower in moisture content and are more moisture-resistant than before.

CYANOGRAN® M

—granular, easily dissolved form of 97% minimum sodium cyanide. Ideal for dry compounding where uniformity of size is desired. "Cyanogran" M will pass through a 10 mesh screen; is retained on a 50 mesh screen. Absence of fines and dusting makes it easy to handle. It sells at the same low price as All-Purpose "Cyanobrik".

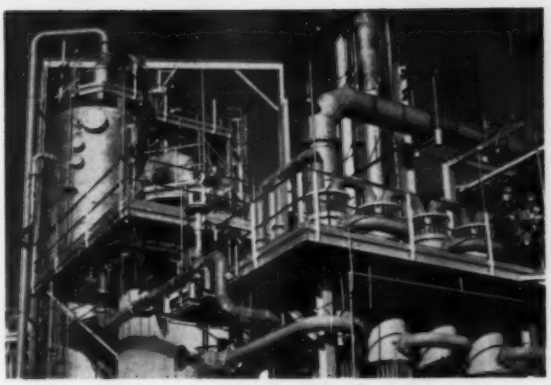
Du Pont sodium cyanides are highly suitable for cyanide electroplating solutions, including copper, brass, zinc and cadmium normally using sodium cyanide. Negligible sulfide content makes them especially attractive for use in sulfide-sensitive, bright copper baths. Specifications:

(NaCN-97% min.; NaCl-0.2% max.; Sulfides as S-0.0005% max.)

POTASSIUM CYANIDE

The extremely low sulfide content and high assay of Du Pont potassium cyanide make it ideal for all plating solutions in which potassium cyanide is specified. It is particularly suitable for use in modern bright cyanide copper, gold and silver plating baths. Specifications:

(KCN-98% min.; KCl-0.5% max.; Sulfides as S-0.0003% max.)



New modern plant assures reliable domestic source of supply

Centrally located in Memphis, Tenn., Du Pont's new chemical plant (above) is producing the high-quality sodium and potassium cyanides mentioned at left. This new source of supply means that you can depend on Du Pont to meet your needs quickly . . . at all times.

Technical service for you

Du Pont's nationwide staff of technical field men is ready to assist you whenever you ask for help. They're backed by a 2-million-dollar Sales Technical Laboratory in Wilmington, Delaware. All lab facilities are at your disposal. For more information on Du Pont electroplating chemicals and timesaving processes, call your nearest Du Pont representative (see below).

E. I. DU PONT DE NEMOURS & CO. (INC.)
ELECTROCHEMICALS DEPT.,
SODIUM PRODUCTS DIVISION
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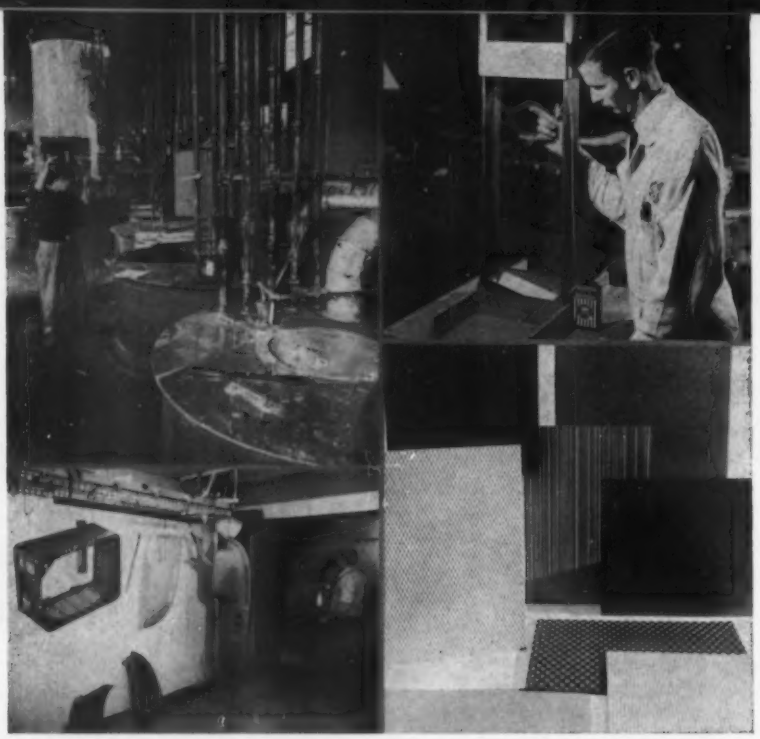
... THROUGH CHEMISTRY



(Top left) Operator positions transfer tank preparatory to adding dispersed color base to organosol batch in color shading kettle at Metal & Thermit's Carteret, N. J., plant. (Top right) "Guillotine" test devised by GE engineers to measure cut-resistance of spray-applied vinyl (Bottom left) Specially prepared textured metal samples receiving organosol spray finish. (Bottom right) Variety of M & T's new spray-application of decorative vinyl dispersion finishes.

METAL & THERMIT INTRODUCES NEW SPRAY FINISH

A new system for the spray-application of decorative vinyl finishes to a wide variety of products was announced at a recent meeting in New York by Donald W. Oakley, vice president of Metal & Thermit Corp. and general manager of the company's Coatings Division.

Mr. Oakley explained that the new system makes possible application of vinyl dispersion coatings to plain or textured metal—steel or aluminum—after it has been fabricated, resulting in worthwhile savings over previously used methods which start with pre-laminated or pre-coated metal sheet.

M&T produces plastisol and organosol coatings at its plant in Carteret, New Jersey. Here, vinyl resin is received from several suppliers in fine powdered form. Solvents, pigments, stabilizers, and plasticizers are also received and stored. All raw materials are checked rigidly for physical and chemical properties, and for uniformity.

Flow of solvents and plasticizers from underground storage tanks to premixing kettles is controlled automatically to within a fraction of a gallon. Dispersions are produced on roll mills. Following shading and blending, plastisols and organosols are pumped to the filling line, where they are packaged automatically. From here, 55-gallon drums or 5-gallon pails are palletized and transferred to the warehouse awaiting shipment to customers.

Color matching is an important part of operations. Test panels are spray coated in a laboratory spray booth. After baking they are checked for color match. Such matches are often made with other vinyl film samples, with cloth, and with other metal finishes. Variables in addition to color include surface gloss, spatter and multi-color effects, and metal tones.

The company lists these advantages for spray-applied vinyl dispersion finishes:

1. Applied to the finished part, therefore requiring no special care in handling metal during fabrication. Faster production possible.
2. Finish applied in the fabricator's own shop using standard spray equipment (also electrostatic spray).
3. Rejects can be stripped of their vinyl finish chemically and then resprayed.
4. Welding and forming operations are done prior to coating.
5. Finish can be sprayed on complex shapes and castings, as well as flat surfaces.
6. No raw or unfinished edges.
7. To change color, merely change the vinyl spray material. No unnecessary investment in inventory.
8. Scrap metal is uncoated, keeping up its value. Waste of vinyl is eliminated.

KOCOUR LICENSED TO MANUFACTURE ROBERTS PRODUCTS

Kocour Co. recently completed a new installation for the manufacture of Roberts Greaseless Compounds in Chicago, under license from the Roberts Rouge Co. For the past 14 years, Kocour has been one of the exclusive distributors of the compounds manufactured by the Roberts Rouge Co. of Stratford, Conn.

By manufacturing the Roberts line in Chicago, the economies of local production and the advantages of controlled inventory and delivery will benefit the Midwestern, Western and Central Southern consumer.

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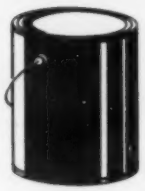
NOW * PERMA-DIP

PERMA DIP 185 . . . A NEW DIP FINISH FOR ANY PLATING THAT TARNISHES

ONE GALLON SIZE



* ELIMINATES RAINBOWING

PERMA-DIP 185 is a wet dip finish that dries in less than 20 minutes (or force dried in 5 minutes), that absolutely will not rainbow. Send for your test 5 gallon sample.

5 GALLON SIZE

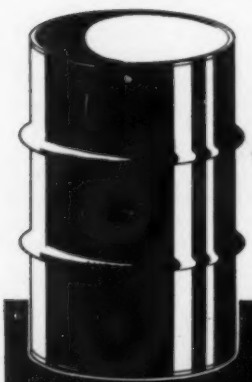
* RESISTS SPOTTING

PERMA-DIP 185 is not a lacquer and will not blush. PERMA-DIP will not turn milky, is non-yellowing and has excellent sulphide resistance.

* CRYSTAL CLEAR FINISH

PERMA-DIP renders a perfectly clear finish that will last indefinitely. The finish is hard and permanent. PERMA-DIP is completely stable.

55 GALLON SIZE



Also available PERMA-DIP 184 for spraying or dry dipping for unexcelled adhesion, sulphide resistance and durability on any plated surface.

* SEND FOR 5 GALLON TEST SAMPLE

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ST. LOUIS 3, MO.

Gentlemen: Please forward immediately the order checked below. I understand that we will be invoiced the amount shown plus freight one month after shipment and that if we are not completely satisfied with PERMA-DIP we may so indicate on the invoice and return the invoice to U. S. Paint Lacquer & Chemical Co.

☐ 5 gal. PERMA-DIP 185 @ $14.50
and 1 gal. reducer @ 2.05
$16.55

☐ 1 gal. PERMA-DIP 184 @ $5.25
1 gal. reducer @ 3.10
$8.35

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Specify DRESSER!

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INDUSTRY NEWS BRIEFS

NEW SAFETY CODE AVAILABLE

The average American worker, statistically safer on the job than at home or on the roads, will enjoy an added margin of safety as the result of the recent revisions to the American Standard covering safety glasses, respirators, and hard hats. The newly revised American Standard Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, is available from the American Standards Association.

The purpose of the 46-page standard is "to provide reasonable and adequate means, ways, and methods for the proper selection and safe use of head, face, neck, eye, and respiratory protective equipment."

Changes made since the previous 1938 edition include the addition of plastic eye protectors, and an increase in strength requirements for eye protection. One section contains 86 definitions of words common to this field. In general, the code has been brought up to date with modern production methods working environments and available safety equipment.

American Standard Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, 48 pp., is available at $3.00 a copy from the American Standards Association, Dept. PR121, 70 East 45th Street, New York 17, New York.

STALEY TO DISTRIBUTE SEQUESTRANTS

The A. E. Staley Manufacturing Co. has made a contract distributorship agreement with Pfanstiehl Laboratories, Inc., of Waukegan, Ill., for marketing Seqlene sequestrants.

Arrangements are being made by Staley to market the products on a nationwide scale. Seqlene sequestrants are relatively new sequestering agents.

CASE STARTS NEW METALLURGY BUILDING

Excavation has begun for Case Institute of Technology's new $2,300,000 Metallurgy Building.

Located along East Boulevard, the building will be an integral part of the new face of Case. Plans for the Metallurgy Building were included in the objectives of the Case $6.5 million building fund campaign which began in late 1957 and recently topped the $6 million mark.

The six-story building containing approximately 71,450 square feet of floor space will be built immediately west of the existing metallurgy building, extending into the bluff which forms the western side of the Case campus. Its lower story will project over part of the present parking lot.

Case's Department of Metallurgical Engineering is headed by Dr. Alexander R. Troiano. When completed, by September 1961, the building will provide for approximately twice the present metallurgical faculty and student body.

NEW LABORATORIES OPENED BY DuBOIS

The DuBois Co., Inc. has opened new laboratories, at 634 Broadway, Cincinnati, Ohio. A skyview installation, the new laboratories occupy the entire top floor of the DuBois Building, providing scientifically ideal and environmentally attractive and convenient study and research conditions for staff personnel.

Equipment includes not only customary chemical laboratory items, but also both prototype and pilot working models, as well as standard commercial machines in some cases, in the fields of spray painting, metal phosphatizing and barrel finishing. DuBois laboratories at branch plants in New Jersey, Texas and California will continue their present activities, with gradual expansion at all points.

USE READER SERVICE CARD; INDICATE A 428.

INDICATE A 429. ➤

The NEW STUTZ Plating Barrels

Low headroom design
New materials

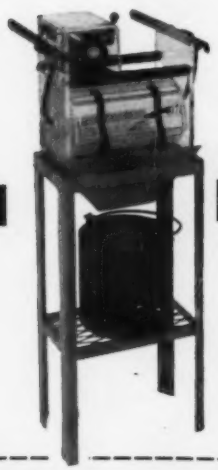
Stutz complete cycle assembly for operation in tanks with driving mechanism located externally. Lifting and lowering of unit reduced to a minimum. Cylinder is totally submerged in operation. Belt drive is positive timing design and belts can be changed if necessary in seconds without tools. Saddle horns are located on 15" centers. Cathode contactors dangler type standard, other types available. Cylinder hangers are cast steel protected with special hard rubber or fused vinyl chloride.

Cylinders can be supplied in special sizes, partitions if necessary and special cathode contactors as required.

Barrel assembly units are made to fit all makes of tanks.

.....PLEXIGLAS · POLYPROPYLENE · TEMPRON · MELAMINE.....

Cylinder rotation in this design is provided by motor drive mounted directly in super structure bridge member. Total weight and overall height has been greatly reduced. Handling therefor is fast and smooth. Cylinder transported from one operation to the next under continuous rotation. In this manner solution dragout is reduced to a minimum. Rinsing time following alkali cleaning, acid pickling, etc., is greatly reduced. Overall dimensions of tanks is lessened by the elimination of motor drive platform. Electric service 440, 220, or 115 volt with grounded cable and Hubble-lock heavy duty safety connector.



Sizes 12" to 18" inside diameter—24" to 42" long—perforations 3/32" standard. All other sizes available.

Tanks in single and multiple—Power equipment — dryers — filters — heat exchangers — chemicals — anodes — ventilation, etc.

Barrel assembly units are made to fit all makes of tanks.

STUTZ *Portable Plating Barrels*

The Stutz Portable Barrel is made in 3 standard sizes with cylinders having inside dimensions of 6"x12", 8"x18" and 10"x20" I.D. Smaller upon application. Standard openings are 3/32". Smaller or larger openings can be furnished as required.

- **Baskets in perforated metals or wire mesh.**
- **Load/Unload Stand for convenient and fast handling of work load.**

Write for Catalog and Prices *We Invite your Inquiries*

The STUTZ Company

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COMPLETE METAL FINISHING EQUIPMENT AND SUPPLIES

For extra aids in cutting plating rejects . . .

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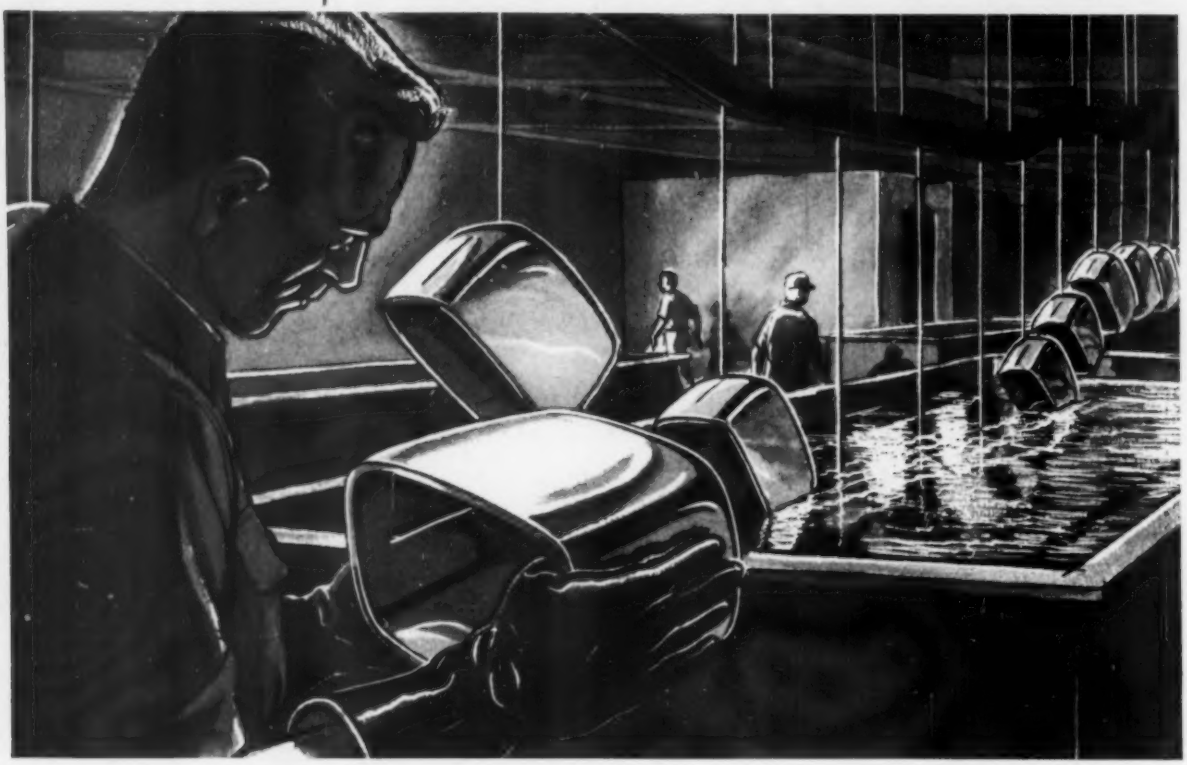
OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 FIELD SERVICE MEN • OVER 160 MATERIALS



Stop spots, add sparkle to plated parts with Oakite RINSITE® in final rinse

Just a little Oakite Rinsite in the final rinse after plating cuts rejects due to water spotting and staining. How? Rinsite "thins out" the rinse water, makes it drain more quickly, more completely.

While it leaves no drops to cause stains or tarnish . . . it *does* leave a thin, non-oily, invisible film that not only gives plated parts extra sparkle, but also protects against indoor rust.

Rinsite does a remarkable job in cold, hard rinse water. If you do tumbling operations, add Rinsite to the rinse and see how metal parts retain their newly-achieved gleam.

This liquid rinsing aid is just one of a line of Oakite materials to help avoid plating rejects. There are hard-working pre-cleaners . . . precision electro-cleaners for various metals. If you're interested in *results*, ask Oakite. Send today for Bulletin F-9822. Oakite Products, Inc., 40 Rector Street, New York 6, N. Y.

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To solve your plating problems

Model E-24 for NICKEL baths—determines metallic nickel (E.D.T.A. method), chlorides and boric acid.

Model AT for ACID TIN baths—determines stannous tin.

Model FT for TIN FLUOBORATE and LEAD-TIN FLUOBORATE baths—determines stannous and total tin.

Model T-6 for TIN-ZINC baths—determines tin metal, and total cyanide.

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PLATING WASTE EFFLUENTS

Model WCN detects as little as 1 ppm cyanides.
Model WCR detects as little as 0.5 ppm chromic acid.
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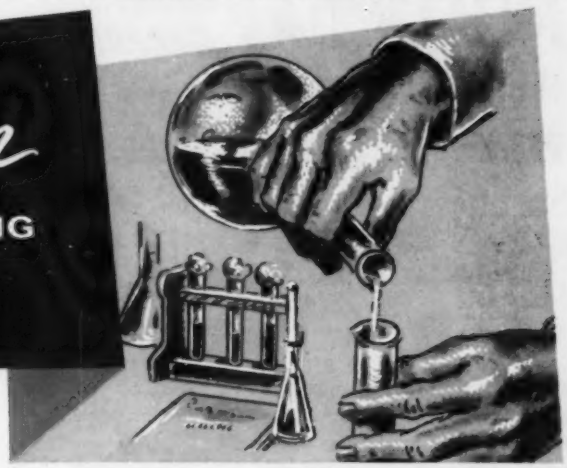

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Its use is suggested on printed circuits, wave guides, and electrical contacts where light contact pressures, low voltage, and intermittent service are involved.

This Rhodium plating solution is easy to use. It operates over a wide range of temperature and current densities. We will be glad to plate samples without charge.

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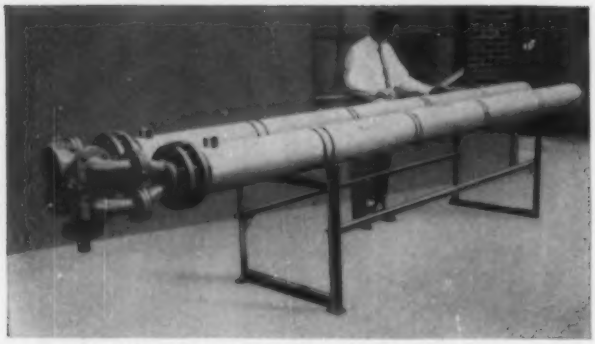

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PATENT ABSTRACTS

DR. D. GARDNER FOULKE

SEL-REX CORPORATION

Nutley, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

2,891,309—6/23/59—ELECTROPLATING ON ALUMINUM WIRE—H. Fenster, assignor to American Leonic Mfg. Co., Philadelphia, Pa.

Successively immerse aluminum wire in an etch type cleaner, an acid conditioning agent, and a sodium zincate solution (95–110 F), copper strike (cyanide), plate with a metal, then draw the wire to a smaller diameter.

8 claims.

No. 2,893,115,—7/7/59—Coating and Working Metal—F. McCawley, assignor to Chicago Development Corp., Riverdale, Md.

Titanium and zirconium alloys which are to be worked at 750–900C are first coated with carbon then made the cathode in a fused electrolyte containing titanium chlorides alkali and alkaline earth chlorides and 0.1 to 5 per cent of the alkali or alkaline earth metal.

1 claim, figure.

No. 2,893,181, 7/7/59—Hydrogen Elimination in Treatment of Metals—W. Burroughs, assignor to General Motors Corp., Detroit, Mich.

Claim 1 reads: "The method of abrading an article made of a metal which is above hydrogen in the electromotive series of elements comprising the steps of placing the article in contact with an aqueous medium, adding to said aqueous medium an oxidizing salt having a cation selected from the group consisting of ammonium, sodium, potassium and lithium ions and an anion selected from the group consisting of nitrate, nitrite, permanganate, and chromate ions, and abrading said metal article whereby the nascent hydrogen as formed from the reaction between the newly formed metal surface and the medium is oxidized to form water."

7 claims.

No. 2,893,927, 7/7/59—Plating Selected Region of n-Type Semiconductors—G. Schnable, assignor to Philco Corp., Philadelphia, Pa.

For semiconductors to which has been applied an ohmic and a rectifying element create a potential difference between these areas such that the rectifying area is more positive than the ohmic so that when immersed in a gold electrolyte the rectifying area is not plated.

16 claims, figure.

No. 2,893,928, 7/7/59—Preparation of Plutonium—M. Kolodney, assignor to USA (ACC).

The deposition of plutonium from a fused halide bath is described.

7 calims, figure.

No. 2,893,931, 7/7/59—Plating Metallic Surfaces—C. Boyett, assignor to Terry Industries, Inc. San Antonio, Texas.

Claim 1 reads: "The method of successively cleaning, deoxidizing and plating the surface of a metal comprising the sequential steps of directing a wet blast containing a suspension of a finely divided, cohesive abrasive against the surface to hone the latter until all foreign substance and oxides have been removed; continuing the wet blasting until a substantially air imprevious layer of abrasive is formed on the surface to seal the latter from the ambient atmosphere; transferring the coated metal to a plating solution without interfering with said layer of abrasive on the metal and before any oxidation of the surface takes place; traversing the solution with an electric current sufficient only to cause enough gas to be evolved from the solution to thereby dislodge the abrasive on the surface of the metal; and after complete dislodgement of the abrasive, increasing the amperage of said current to plate the surface in said solution.

No. 2,893,932, 7/7/59—Metal Electrodeposits—H. Haas, assignors to Dehydag, Dusseldorf, Germany.

Brightening Agents for nickel baths is described as organic compounds of the formula H A L-R-Q and their water soluble salt.

H A L is a halogen

R is an aliphatic, cycloaliphatic and aromatic radical

Q is a water solubilizing radical (sulfuric and phosphoric acid, hydroxyl ether alcohol and polyether alcohol radicals).

11 claims.

No. 2,893,933, 7/7/59—Nickel Plating—J. Winters and L. Westbrook, assignors to INCAR, Inc. Cleveland, O.

Polyacrylamide when added to a nickel solution in the amount of 0.05 to 0.5 g/l is claimed as a nickel brightener.

7 claims.

No. 2,893,934, 7/7/59—Acid Cadmium Plating—L. Westbrook, Solon, Ohio.

Polyethylene oxide condensation products wherein the hydrophobic portion is an alkyl phenol, aryl phenol, fatty alcohol, fatty acid and rosin amine, are climed as brighteners in cadmium fluoborate baths.

12 claims.

No. 2,893,935, 7/7/59—Producing Titanium—I. Johns, assignor to Monsanto Chemical Co., St. Louis, Mo.

A fused salt method is described wherein gaseous $TiCl_4$ is passed into the molten salt bath.

2 claims.

2,894,517—7/14/59—WORK HANDLING APPARATUS—J. Davis, assignor to The Udylite Corp., Detroit, Michigan.

A work transfer apparatus is described.

8 claims, figure.

No. 2,894,850, 7/14/59—Galvanizing Strip—J. Greene and J. Holzwarth, assignors to General Motors Corp.

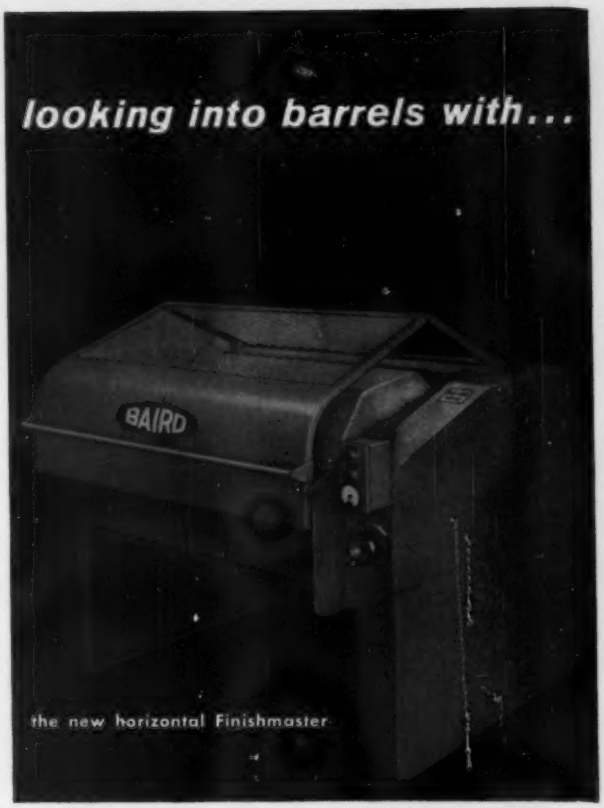
To galvanize a portion of a strip, apply alkali metal aluminate to portion of strip not to be galvanized, pass through a reducing atmosphere at 1250–1450F, then dip into galvanizing bath while still under reducing atmosphere conditions.

7 claims, figure.

No. 2,894,852, 7/14/59—Coating Aluminum—H. McMorris and F. McCall, assignors to Myron P. Laughlin, St. Petersburg, Fla.

Produce a pit pattern on the aluminum of not less than 60 depression lines per linear inch then fill the pits with color to produce substantially a solid color effect.

4 claims.



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No. 2,894,860, 7/14/59—Descaling—E. Engelhardt, assignor to Capito and Klein Ag, Dusseldorf.

Pickle the metal to loosen the scale then pass into water over an ultrasonic unit which blasts off the scale.

6 claims, figure.

No. 2,894,865, 7/14/59—Coating Aluminum—M. Pryor, assignor to Kaiser Aluminum and Chemical Corp., Oakland, Calif.

When coating aluminum alloy parts where entrapment of solution is a problem, chromate coat (chromate, phosphate, fluorine ions) as usual then treat with a reducing agent that does not give insoluble oxidation products.

5 claims.

No. 2,894,883, 7/14/59—Electropolishing Uranium—D. Walker and R. Noland, assignors to USA (AEC).

Use a solution containing 35–65 per cent by volume of sulfuric acid, 1–20 per cent of glycerine and from 25–55 per cent water.

4 claims.

No. 2,894,884, 7/14/59—Nickel Coating Uranium—A. Gray, assignor to the USA (AEC).

Anodically etch the uranium in an aqueous phosphoric acid solution containing chloride ions, clean in aqueous nitric acid and promptly electroplate in a nickel sulfite bath.

See also 2,894,885 describing the copper plating of uranium with 7 claims.

7 claims.

No. 2,894,886, 7/14/59—Electrodeposition of Transition Metals—E. Wainer, assignor to Horizons Titanium Corp., Princeton, N. J.

A fused salt electrolyte for plating Ti, Zr, Hf, Cb, Va and Ta is described.

12 claims.

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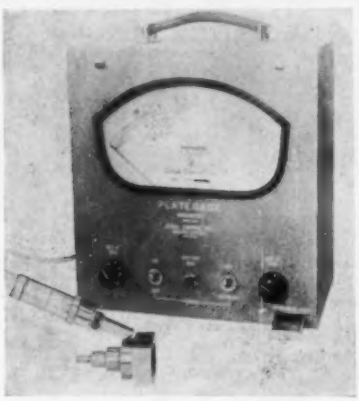
EQUIPMENT AND SUPPLIES

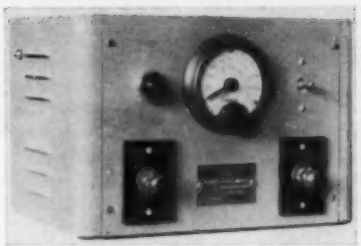
E—401. Plating Thickness Gage—Dyna-Empire, Inc. announces the introduction of the Model D-873 Plategage. This instrument is claimed to be capable of precision measurements of plating or coating thickness from 0.0001 to 0.015 in. It provides fast and accurate direct reading



thickness measurements of these platings: silver, copper, nickel, chromium, cadmium, zinc, brass, tin, etc. on iron or steel base materials.

A specially designed magnetic probe, with its geometrically described tips, permits precision measurements to be made on flat or irregularly contoured surfaces and large areas.

E—402. Timing Panel—A timing panel suited for the precious metal plating of rhodium, Hamilton, and antique gold has been announced by Macarr Inc. The unit is designed to save time in labor, precious metal and rejects. The timer auto-



matically starts upon placing work on cathode rod. It will time for the pre-set interval and at the end of this time will simultaneously operate a visual and audible alarm, and will reduce deposition to a very small proportion, saving precious metals normally deposited due to lapse of time in the removal of work. Upon removal of work from the cathode rod, timer will automatically reset and be ready for the next cycle.

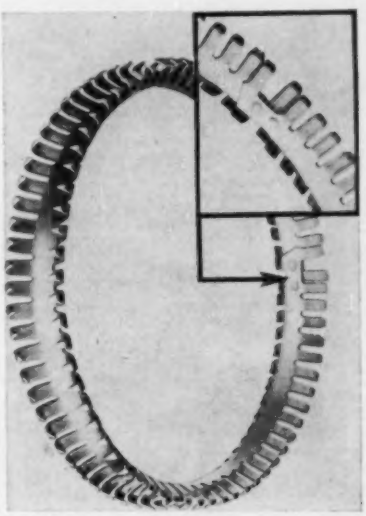
E—403. Transistorized Ultrasonic Cleaner—The world's first transistorized ultrasonic cleaner has been introduced by The Narda Ultrasonics Corp.

It is said to handle anything from tiny semiconductors to meters and clocks, and from miniature bearings to gyros, as well as other components of electronic and mechanical systems.

Unlike tube-equipped ultrasonic models which consist of separate generator and cleaning tank units, the new transistorized cleaner is a self-contained unit. The base houses the generator and a recessed circular barium transducer upon which is placed a 400 milliliter beaker containing the cleaning solution. The transducer sets up the sound waves.

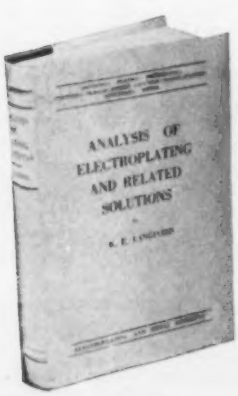
E—404. Clinch Rings—Newly developed clinch rings with steel over-lap at the weld are now used as standard components on all air-cooled buffs of American Buff Co.

The clinch rings' holding power is said to be increased greatly by the provision



of the steel overlap, adding extra long life to each buff without breaking at the weld. An improved method of die-forming clinch-ring teeth is used to produce stronger, 25 per cent larger teeth than before. The welding procedure, the unique die-forming of teeth, and the steel overlap provide a secure grip.

NEW EDITIONS



Analysis of Electroplating and Related Solutions by K. E. Langford, F.R.I.C., A.I.M. 2nd Edition December 1958. 453 pp. Price $9.25 postpaid.

Completely revised. 40 new methods, mostly based on E.D.T.A., have been added.

Contains over 300 methods for the determination of principal constituents and impurities, together with chapters on Sampling, Control of Cleaners, Pickles, Dips, Etches, Phosphating Solutions and Electrobrighteners, the analysis of Plating Salts and of Water, Physical and Physico-chemical Methods of Analysis and the Preparation of Standard Solutions for Volumetric Analysis.

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Surface Treatment and Finishing of Aluminium by S. Wernick, Ph.D., M.Sc., F.R.I.C., F.I.M. and R. Pinner, B.Sc. 2nd Edition August 1959. 607 pp. + XLV. 204 figs. 120 tables. Price $13.25 postpaid.

Comprehensive and up-to-date survey of all available processes including Mechanical Treatments, Electro- and Chemical Polishing, Cleaning, Etching, Conversion Coating, Anodizing, Hard Anodizing, Properties of Anodic Oxide Coatings, Plating, Organic Finishing, Vitreous Enamelling and Metal Spraying.

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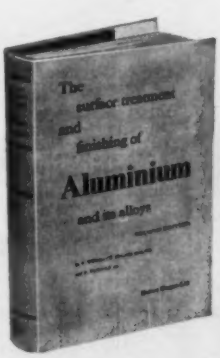

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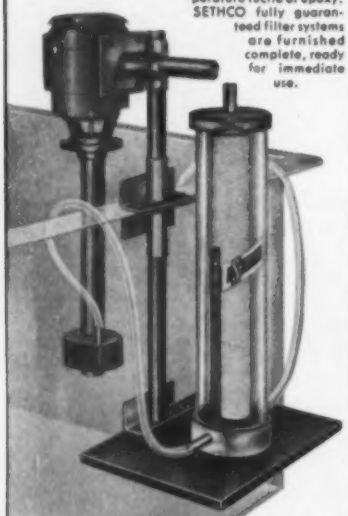

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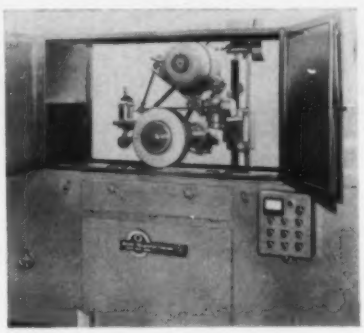
L—405. Finishing Process Testing Machine—A new finishing process testing machine designed to enable manufacturers of buffs, compounds and base metals as well as metalworking finishing plants and departments to study and evaluate finishing process variables is now available from Acme Manufacturing Co.

The new machine is a production model of an experimental prototype that was delivered to the American Electroplaters' Society in 1957 for use in its finishing research. The buffing wheel, the compound, the character of the base metal and such variables in the finishing process as pressure and time have to be considered in attaining a desired finish quality. The Acme testing machine has been developed to permit study of all of these variables.



The testing machine consists of a cabinet base that houses the mechanism for moving sample materials and a standard Acme G-1 adjustable lathe on which the buffing wheel is mounted.

The part samples are mounted by toggle clamps or magnetic means on 5 by 12-in. platens spaced 40-in. apart on an over-and-under conveyor arrangement. As each platen passes under the buffing wheel, the wheel pressure is accurately measured by a beam scale. The conveyor is driven by a motor through a variable speed drive that provides traverse speeds of from 10 to 30 feet per minute.

Buffing wheel speeds are adjustable from 700 to 2100-rpm. Wheels from 6 to 20-in. diameter can be mounted on the lathe spindle which can be of a stroking type if desired. Wheel pressure of up to 50-lb can be preset by a spring or air cylinder wheel loading arrangement.

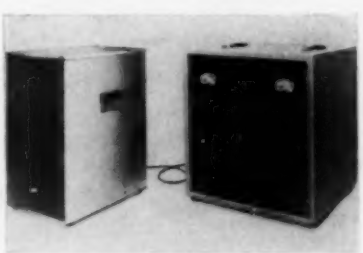
Exhaust fans at each side of the rear of the base cabinet keep the finishing area of the machine free of buffing dust. The amount of horsepower drawn by the motor driving the buffing wheel is indicated by an instrument on the front of the machine.

E—406. Dumper—The new Tubar dumper for use in plating departments for the discharging of small stampings into the rotating drum of a parts cleaner has been announced. Since the dumper platform is flush with the floor, the container can be slid, or hand trucked, directly on to the platform without an inch of lifting. The operator has complete control of the rate of discharge into the machine, and can dump only a portion of the work if he so desires.

E—407. Rotating Power Tumbler—The Dayton Rogers Mfg. Co. has developed a new portable rotating power tumbler for all metal cleaning applications. It consists of a rotating drum, air motor driven, with speeds from 2 to 12 rpm.

Parts can be dropped into the drum through the large hinge door which is secured by two spring-loaded locks.

It is constructed of materials to withstand high temperatures for immersing the unit in practically any high or low temperature solutions. The power tumbler is now made in three sizes: 11, 15 and 18 in. drum diameters.



E—408. Ultrasonic cleaner—An ultrasonic cleaner for applications requiring high energy density has been announced by National Ultrasonic Corp. Model 260 features a 12-gal tank made of heavy gauge polished stainless steel. The tank is 16 by 16 by 12 inches. Fifty per cent of the bottom of this tank is covered with driving elements, a more complete coverage than is found in most ultrasonic cleaners. Actual radiating surface is 96 sq in.

The 115-volt ac single-phase 60-cycle generator, designed for continuous operation, delivers an average power output of 500 watts and produces peaks of 2000 watts.

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1—7500/3750 AMPERE, 6/12 VOLT, 25°C. **CHANDEYSSON,** Synch.

1—6000/3000 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS,** Synch.

1—5000/2500 AMPERE, 12/24 VOLT, **CHANDEYSSON,** Synch.

2—5000/2500 AMP., 9/18 V., 25°C., **CHANDEYSSON,** Synch. Exciter-in-head.

1—5000/2500 AMPERE, 6/12 VOLT, 25°C. **CHANDEYSSON,** Synch.

1—4000/2000 AMPERE, 6/12 VOLT, **H-VW-M,** Synch., Exc.-in-head.

2—3000/1500 AMPERE, 12/24 VOLT, **CHANDEYSSON,** Exciter-in-head.

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1—**RICHARDSON-ALLEN** 1000 Amp., 9 VOLT DC for 220/3/60 remote control.

1—**NEW G. E.** 2000/1000 AMPS., 6/12 V. Remote Control 440/3/60 AC.

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1—**MERCIL** Ball Burnishing Barrel, Size 1.

3—**LASALCO** Ball Burnishers, No. 1, 2 & 4, Lined or Unlined.

2—**L'HOMMEDIEU** 5 H.P. Variable Speed Buffer, Model 18 and **DIVINE** 5 H.P. Variable Speed Buffers.

10—Buffing Lathes—**HAMMOND, DIVINE, U. S.,** etc., from 3 H.P. to 20 H.P.

1—**INDUSTRIAL** RDR-1 Rubber Lined Filter, Size 14 x 28.

2—**INDUSTRIAL** Type SC Filters for Cyanide. 18x48 and 18x36.

1—**HAMMOND** 7½ H.P. Variable Speed Buffer.

4—**STEVEN BADER** Abrasive Belt Polishers

3—**AMERICAN** Blower type HS fans. Size 330-10.

10—**DUSKOP** Dust Collector Cabinets. Sizes No. 550, No. 850, No. 1100.

1—**H-VW-M Munnings-** Type (Mechanical lift), Full Automatic, Plating Machine 70' long x 4' wide x 36" deep x 10½' overall height.

1—**CROWN** 48 x 36, 2 compartment horizontal tumbling barrel lined or unlined.

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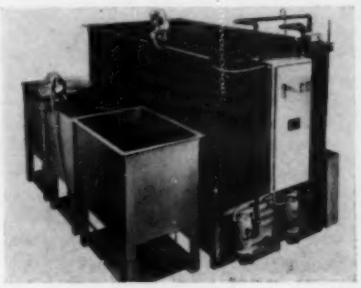
E—409. Drying Agent—Conversion Chemical Corp. has made available Kenvert Aquanol, a drying assist for pickled or plated parts, that also prevents corrosion and stops rusting associated with poor drying procedures. It is said to eliminate spotting on chromium plate, staining on silver and copper plated work. It is especially suited to applications where high rinse water temperatures are unavailable, or where automatic equipment lacks drying facilities. It is also usable where thinner than normal plating is needed to accommodate the close tolerances required for precision functioning.

Kenvert Aquanol is a viscous liquid, forming an emulsion with water, and sheds the water from plated parts by film formation and polar repulsion.

E—410. Cleaning/Burnishing Compound—Self-tumbling steel, brass or copper parts can now be prepared for barrel plating by a simple process built around a new combination cleaning-burnishing compound, Clepo 12-K, according to Frederick Gumm Chemical Co.

Clepo 12-K, supplied as a white dust-free granular compound, is added to water, the work loaded in an oblique barrel and the charge allowed to tumble for 5–30 minutes. This operation cleans and burnishes in one operation and, after rinsing with clean water, produces parts claimed to free of waterbreaks, lightly deburred and also burnished. These parts require only an acid dip and rinse prior to plating.



E—411. Waste Disposal Unit—A package unit for treating plating room chromium wastes is now available from the George L. Nankervis Co. It includes all the necessary tanks, pumps, mixers, and controls to effectively treat up to 600 gal of chromium wastes per hour.

The new unit, designated as the Chromator Model 3340, collects chromium rinse water in a sump and then pumps this into an eight compartment mixing, reaction, and settling tank. Here sodium metabisulphate, sulfuric acid and caustic are automatically metered into the waste to reduce the hexavalent chrome to trivalent and to regulate the *p*H to between 7 and 8. Reduction of the hexavalent chrome is less than one ppm.

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Now . . . at a low, low cost . . . you can get brilliantly bright and sparkling colors from an improved Luster-On Chromate dip process for your zinc-plated small parts.

And . . . even more important . . . these are not just dull identification colors. They are glamorous and sales-building golds, yellows, blues, reds, greens, violets, brass and copper hues.

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PERSONALS

DR. ALEXANDER ROSS has received appointment as organic group leader, Research & Development Division, Metal & Thermit Corporation.

Previously, Dr. Ross was a research section chief with Olin Mathieson, and assistant research supervisor for Ethyl Corporation. He received the BS degree in chemistry from Wayne University, Detroit, and the MS and PhD degrees in organic chemistry from the University of Michigan.

From 1943 to 1945, Dr. Ross was a first lieutenant and pilot with the U. S. Air Force.

Dr. A. Ross

P. F. Reddy

PAUL F. REDDY is a recent addition to the Boston District staff of Wyandotte Chemicals' J. B. Ford Division, covering the Rhode Island-Southeastern Massachusetts area.

Paul Reddy's ten-year record of service to the industry includes metal cleaner recommendations, conducting shop test runs and demonstrations of various metal cleaner applications.

Mr. Reddy is a member of the AES, the American Chemical Society, and holds a degree in chemistry from Boston College.

●

ROY A. HOEGH has been added to the executive staff of the Stutz Co. Mr. Hoegh will serve as manager of the Plating Barrel Division of the company, and will also serve as special assistant to George A. Stutz.

R. A. Hoegh

Dr. O. E. Mattiat

Mr. Hoegh served for the past 10 years with the Mercil Plating Equipment Co. For 8 of the 10 years he served as general manager.

Mr. Hoegh is a graduate of Northwestern University with a BS degree in mechanical engineering and a BS degree in industrial engineering.

●

IRA R. LIVINGSTON has been elected executive vice president in charge of sales of Chemclean Products Corp., College Point, N. Y., at a recent meeting of the board of directors.

The company specializes in the formulation and manufacture of chemicals for cleaning, polishing, and protecting metals. It has offices and plant at 15-08 121st Street, College Point 56, N. Y.

With the company for eight years in administrative and sales capacities, Mr. Livingston has been active in selling to users in the welding and metal fabricating fields. He announced that applying his experience to broaden distribution of the company's products in these industries will be one of his early objectives.

DR. OSKAR E. MATTIAT has been appointed chief scientist of Acoustica Associates, Inc., of Plainview, N. Y., and Los Angeles.

Dr. Mattiat, who received his PhD in Germany, has been engaged in the development of acoustic systems and piezoelectric devices since 1934 at the German General Electric Co. in Berlin, the Clevite Research Center in Cleveland and, more recently, at the Astrophysics Development Corp. division of Curtiss-Wright Corp. in Santa Barbara, California.

At Acoustica, he will be responsible for all developments in the fields of piezoelectric and magnetostrictive ceramic materials. He will have his headquarters in Los Angeles.

●

JOHN B. GREEN has been appointed assistant to the president, Allied Chemical Corp.'s Solvay Process Division.

Mr. Green received a BA degree in economics from the University of Michigan and a Master's degree in business administration from New York University. He joined the company in 1939. Appointed supervisor of the Fixed Capital and Special Studies Section in 1955, Mr. Green transferred to Solvay two years later as assistant division comptroller. In 1958 he became division comptroller.

●

ROBERT F. MORRISS has received appointment by The Hubbard-Hall Chemical Co. as metal finishing and supply field representative in New Jersey and Metropolitan New York. Mr. Morriss has had 15 years experience in the metal finishing industry and comes to Hubbard-Hall from the Hanson-Van-Winkle-Munning Co.

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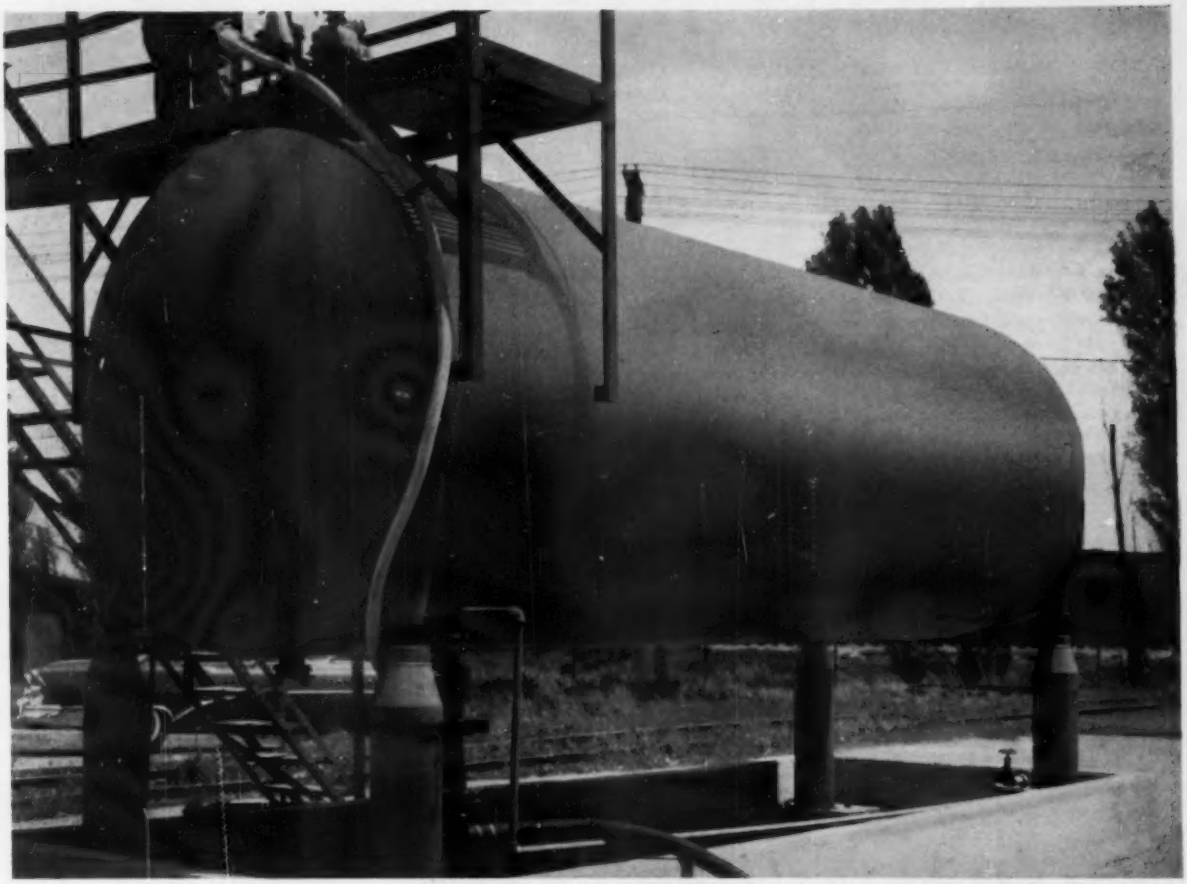

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Then stack the performance of this Pfaudler Glasteel storage tank up against any other you can buy. What you'll discover is that this is the tank that saves money when you handle corrosives.

Glasteel gives you *glass* inside for corrosion resistance, *steel* outside for structural strength.

You can use Glasteel with any acid, except HF, and most alkalies without the continuous, costly replacement you've come to expect from many other materials.

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You can get Glasteel storage tanks in horizontal or vertical styles, with capacities from 500 to 35,000 gallons. Openings and nozzle arrangements to fit your needs.

How to find out more. The corrosion resistance of Glasteel is also available in reactors, columns, pipes, valves, and fittings or in complete acid-recovery systems engineered to your requirements. For details on tanks, ask for Bulletin 975; for a look at the complete line, ask for our Fluidics Buyer's Guide. Or write, outlining your needs, to our Pfaudler Division, Dept. PL-40, Rochester 3, N. Y.

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ROBERT H. PROBERT, most recently representative for Wyandotte Chemicals has been assigned as sales engineer at the new office at 1000 Peachtree Street, Atlanta, Georgia, opened by Sel-Rex Corporation, Nutley, New Jersey, manufacturers of the world's largest selling precious metal plating processes. Sales of semiconductor rectifier equipment, liquid clarification filters, full-automatic plating machines, and metal finishing equipment and supplies manufacturered by Sel-Rex's wholly-owned subsidiary, The Meaker Company, Chicago, Illinois, will also be handled through this new office.

Mr. Probert will cover North and South Carolina, Georgia, Alabama, Florida, and the eastern portion of Tennessee. A graduate of Georgia Tech, he was associated with Atlanta Plating Works for nearly ten years, latterly as shop manager. An active member of the American Electroplaters' Society, Mr. Probert has served on various committees with the Miami and Southeastern Branches, and was secretary of the Blue Ridge Branch for one year, as well as secretary of the Southeastern Branch for three years.

Mr. Probert has undergone a period of technical training at the Sel-Rex Nutley laboratories.

R. H. Probert

F. T. Eddy

FRANCIS T. EDDY has joined TEL-autograph Corp. of Los Angeles, Calif., as assistant to the president. He comes to his new connection from the Bayside Plating Co., Costa Mesa, Calif. Before going to California, Mr. Eddy was president of Technicraft Laboratories Inc., Thomaston, Conn., and had previously been with Chase Copper and Brass Co., Waterbury.

A graduate of Brown University, Mr. Eddy has been prominent in AES national, regional and Branch affairs. He is a national past president and was president of Waterbury Branch.

•

HENRY B. KOEHLER has been appointed manager of electrical sales of Hanson-Van Winkle-Munning Co.

In his new position Mr. Koehler is responsible for the sale of all H-VW-M electrical equipment which includes rectifiers, low-voltage dc generators, tank and carbon pile rheostats, and the H-VW-M Equaload generator brush. He has been with the company since November 1956.

Prior to joining H-VW-M he was a power representative with the Public Service Electric and Gas Co. for eight years.

Mr. Koehler is a graduate of Rutgers University, where he received his electrical engineering degree in 1948. He is an active member of the American Electroplaters' Society, American Institute of Electrical Engineers, and he is chairman of the Electroplating Rectifier Section of the National Electrical Manufacturers Association.

B. A. Farmer

H. B. Koehler

BERNARD A. FARMER has been appointed by Frederic B. Stevens, Inc., as sales representative to the metal finishing industry in the New York City area, New Jersey and parts of Pennsylvania. He will service accounts in this territory with the Stevens line.

Mr. Farmer joined Frederic B. Stevens with several years of sales and service experience in the metal finishing industry. His home is at 8114 Fifth Avenue, North Bergen, New Jersey.

DYNA-EMPIRE PLATEGAGE

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precise plating thickness measurements from .0001 to .015" in a matter of seconds

In inspection and production—wherever precise plating thickness measurement is essential, the Dyna-Empire PLATEGAGE provides a rapid and simple means of determining the thickness of a plated or painted surface on ferrous base metals. These PLATEGAGE features assure production speed and ease of operation—laboratory accuracy • *Direct reading*—of plating or coating thickness from .0001" to .015" • *Precise measurements of any contour with specially designed probe tip*—inside or outside diameter (as low as 1/16" O.D. and ½" I.D. on contoured surfaces) of pipes or tubing and holes in stampings, and castings. • *Easy operation by unskilled operators* — one probe covers all measurements; no special scales to set up — no calibration curves needed. Read coating thickness directly on the meter. • *Non-destructive measurements*—no parts wasted in tests. • *Transistorized construction*—guarantees long operating life • *Completely portable—weight only 9 lbs.;* battery or line operated. • *No extras to buy*—unit complete with batteries, a universal probe to cover every measuring need and two thickness reference samples.

Fast and accurate direct thickness measurements of these platings: Silver, copper, nickel, chromium, cadmium, zinc, brass, tin, etc. on iron or steel base materials. Measurement of paint thickness on automobile bodies, refrigerator cabinets, transformer casings, iron or steel cans, etc.

Price $345.00 complete

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TRADE LITERATURE

L—401. Plating Controls—The new line of low-cost Hoffman DC-Matic cut-off plating controls offered by Hoffman Control Co. is described in a new bulletin.

The controlled current cut-off feature is said to conserve materials, electricity, and manhours. Barrels are moved while current is off; no arcing, explosions, splashing of solutions—safeguards operators.

L—402. Abrasive Finishing for Silver—Step by step technical data on how to produce such finishes as dull matte, dull satin, Butler, semi-mirror and mirror on solid silver and silver alloys are given in a data sheet made available by The Lea Manufacturing Co. Data includes recommendations for compounds, wheels, wheel speeds and buff lubrication.

L—403. Filtration Equipment—"Complete Filtration for Liquids and Gases", a new 8-page catalog, gives a brief description of each of the products in the Commercial Filters Corp. line of filtration equipment. The line includes Fulflo, Delpark, Honan-Crane and Michiana filters for continuous micro-clarity of all types of industrial fluids—chemicals, gases, oils and water. Information is classified according to applications, operating pressures, and sizes. In addition to the filters, various types of filter media are described and illustrated. Copies are available at no charge.

L—404. Gluconates—Chas. Pfizer & Co., Inc., has issued Data Sheet No 549 entitled, Gluconates—Additives for Caustic Soda-Aluminum Etching Solutions. In its nine pages, such subjects are covered as advantages of gluconates, preparation of caustic soda-gluconate solutions, operational recommendations, storage and handling.

L—405. Chemical and Metallurgical Products—A new brochure describing products and services of Vitro Chemical Co. is now available.

The brochure covers the reorganization of three sister firms, Vitro Uranium, Heavy Minerals and Vitro Rare Metals into the single firm of Vitro Chemical Company, a division of Vitro Corp. of America. It also displays the company's new symbol and new packages. There are 46 chemical and metallurgical products for use in manufacturing and research listed.

L—406. Burnishing Media—The Abbott Ball Co. offers new Bulletin AP-1, which describes and illustrates the company's bearing balls and metals finishing materials.

The construction, performance and adaptability of each product are discussed in detail. Representative applications, size and dimensional data, and a list of Abbott's sales agents are given. Also included is important tabular information on conversion of old Abbott standard ball nomenclature to the new, simplified AFBMA nomenclature.

L—407. Semi-Conductor Devices—An 8-page technical newsletter published by International Rectifier Corporation contains a 4-page article entitled 'Properties of Semiconductor Devices Affecting Voltage Division', in which voltage distribution and various methods to achieve equality are discussed, analyzed, and recommendations made for the solution of specific problems.

E—408. Belt Grinding—The December 1959 issue of The Abrasives' Workshop, published by The Carborundum Co., highlights the use of abrasive belt swing frame grinders. Savings up to 60 to 80 per cent are claimed for abrasive-belt over conventional cup-wheel or depressed-center wheel grinding.

Also of unusual interest is a description of a belt machine that gives a 32-or-finer micro inch finish to jet blades at a rate of better than one a minute.

L—409. Rubberized Abrasives—The Cratex Manufacturing Co., makers of resilient rubber bonded abrasive wheels, points and sticks for micro-deburring, smoothing and polishing, has published a new Application Manual for industrial use.

The manual includes information concerning the many uses for rubberized abrasives, case histories on a variety of typical applications and a copy of the latest Cratex catalog. The most efficient methods for mounting, dressing and trueing and recommended operating speeds are given in brief but complete form.

L—410. Blast Cleaning—The "facts of life" concerning the use of shot and grit abrasives in blast cleaning are detailed in a new booklet, published by the National Metal Abrasive Co.

The illustrated, 30-page booklet is divided into five sections.

The first provides an appraisal of blast cleaning functions and materials, including common fallacies, considerations of shot and grit size, consumption, maintenance costs and time and finish factors.

Progress and research achievements in the field of abrasives is the subject of the booklet's second section. Housekeeping habits and their effect on the use and performance of shot and grit is the subject of the third section.

The booklet's fourth section incorporates several chart-illustrated methods of computing costs of new and improved abrasive products against existing or former materials.

PRIOR ISSUES OF TECHNICAL PROCEEDINGS AVAILABLE FOR YOUR ORDER

ASIDE from the fast dwindling supply of copies of the AES's world acclaimed GOLDEN JUBILEE EDITION of its book TECHNICAL PROCEEDINGS (1959 Edition), the Society has a limited quantity of the 1958 Edition of that book also available for sale.

Copies of the 1958 Edition are priced at $12.00 per copy domestic, $15.00 per copy foreign. Orders are processed on strictly a "first come-first served" basis. Payment in full must accompany each order.

In addition, the AES has a very limited supply remaining, with steady demand, of the 1957 Edition of its TECHNICAL PROCEEDINGS. These are priced at $10.00 per copy domestic, $12.50 per copy foreign. Payment in full must be received with each order.

In ordering, please make checks payable to American Electroplaters' Society, Inc. Mail orders to:

AMERICAN ELECTROPLATERS' SOCIETY, INC.
American Building, 443-445 Broad Street, Newark 2, N. J.

BRANCH NEWS

Total AES Branches U. S., Canada, Australia, April 1, 1960—58.

BOSTON

Swift Talks to Boston Branch on Metallurgy

Boston Branch met Thursday, Feb. 4, at the Hotel Statler Hilton with President **Hugh Foley** in charge. Communications were read concerning the New York and Philadelphia Annual Meetings, the Interim Meeting as well as the letter concerning reservations for next July at Los Angeles. Transportation to Los Angeles was discussed, as well as the prospective improvement in Research Memberships. Three new members were elected. **George Marotta** discussed the Boston proposal that Finishing of Light Metals be the symposium topic of the 1961 Convention, and the conference with the Editorial Board at Chicago, Jan. 29. Mr. Marotta announced the tentative committee for the 1960 Boston Annual.

Lou Gagnon announced basic progress on the 1961 Convention.

Bob Pierce presented Secretary **George P. Swift,** who discussed 'Metallurgy and the Plater' from the point of view that the plater was always behind the 'eight ball' regardless of what he did. The advances in steel making and addition of alloying elements were traced as adding to the platers' woes. Brass, bronze, aluminum and zinc alloys were discussed similarly. The increase in the number of metals plated as protective or decorative coatings were also mentioned chronologically, showing how the plater always has to be learning about new methods and new processes.

George P. Swift
Secretary

BRIDGEPORT

Pierce is Speaker; Barrett Chemical New Sustaining Member

The regularly scheduled business meeting and educational session was held in the main ballroom of the Hotel Barnum on Friday, Feb. 12, 1960. President **Allen Ferguson** called the meeting to order. Fifty members and guests were present.

Three applications for membership were presented.

Ed Owen, chairman, thanked all members of his committee for their cooperation in making the Christmas dinner dance both a social and financial success.

Al Ferguson, chairman, reported on the New England Regional.

The following were nominated for Branch officers for the fiscal year 1960–61: President, **Wm. Hyatt Jr.**; first vice president, **Wm. Lindsay Jr.**; second vice president, **Emil Bergen, Richard Barrett, Benjamin Gallo**; librarian, **E. Bergen**; secretary-treasurer, **R. Parker**; sergeant-at-arms, **Edmond Owen.**

The National office advised the secretary by letter that Barrett Chemical Co. had been accepted as a Sustaining Member of the Society and credited to the Bridgeport Branch. The authorizing official was Richard C. Barrett.

Tickets for the N.E. Regional were placed on sale by the secretary. First come, first served.

Floyd Tatum, Kansas Jayhawk, won the door prize.

Our librarian, **Albin Jocis,** introduced the featured speaker of the evening **W. J. Pierce,** assistant manager of plating research of Harshaw Chemical Co. of Cleveland. Mr. Pierce's subject, titled "Metallographic Technique as applied to Electroplating" included thickness determinations, surface preparations, process characteristics, corrosion structure, and determinations of the cause plating defects. It was augmented by many slides of the subject matter. His discussion was very well received and he was given a rising vote of thanks for having visited us. Mr. Jocis announced that he was leaving this area to embark on a new venture in St. Louis, Mo. He voiced his thanks for having been given the privilege and honor of serving the Bridgeport Branch as librarian and wished us well in the future.

Bob Parker

BLUE RIDGE

Dr. Kleiner on Leveling

The regular monthly meeting was held on Feb. 5 at the Elks Club in Greensboro, North Carolina. The foul weather and flu ridden Blue Ridge Branch scraped-up and mustered 20 members and guests from Greensboro and Winston-Salem, North Carolina; Bristol, Tennessee; Chestertown, Maryland; and Matawan, New Jersey, to hold one of the best all round meetings of the season.

Dr. Walter Kleiner of Hanson-Van Winkle-Munning Co. delivered a very informative talk on "Leveling and Brightener Consumption in Bright Nickel", which was attentively enjoyed by all. The special hour followed the speaker and this new idea was accepted and enjoyed by all.

Mike Milo and **Frank Holliday** made the arrangements with the Elks Club and from the results and cooperation from the Elks Club it looks as if we might meet there the next time it is Greensboro's turn.

Robert H. Probert
Secretary

BRITISH COLUMBIA

Electroplating Course Report Heard

A general meeting was held at the Loughheed Hotel, Loughheed Highway, North Burnaby, B.C., on Jan. 27. There were 17 members and guests present.

Following cocktails and dinner, the meeting opened at 8:30. President **Nelson Shepherd** welcomed members and guests to the first meeting for 1960.

Walter Kellerman gave a brief report on the night school course. It is going very well, he said. There are 22 students. Mr. Kellerman referred to a list of equipment required by the night school authorities, in order to assess the worth of continuing the course through the next term. **W. Marquardt** moved that an investigating committee be set-up, consisting of 3 or 4 members, including Instructor Kellerman, as chairman. The other members of the committee appointed are W. Marquardt, **C. Schlossareck** and **R. Wolloschuk.**

G. Smith moved that we appoint a committee of three, to act as an Educational Committee until the end of this year, to look after the interests of the Branch in connection with the current night school course, with powers to report only. This motion was seconded by **T. Wallington,** and carried. Committee appointed: G. Smith, T. Wallington and W. Kellerman.

W. Kellerman moved that the appointed committee looks into the curriculum of the night school course, and the chairman of the committee report to the membership.

The President read a letter from National Headquarters regarding the Charles Henry Proctor Memorial Leadership Award. W. Marquardt moved that **Norman McLeod,** treasurer, be proposed for this honor. The motion was seconded and carried.

D. Armstrong
Secretary

BUFFALO

Marzano Presents Paper; Membership Program Outlined

The Buffalo Branch held its February meeting Friday, Feb. 5, at the Niagara

BRANCH SECRETARIES

Branch News is required of all Secretaries monthly by AES Bylaws. First of the month is Branch News deadline for next PLATING issue. Any items on hand on that date will be carried in that edition. Later arrivals will appear in the issue immediately following. In reporting talks given by speakers before the Branch, please give titles of the talks, the speakers' full identification and any other pertinent information of interest to other Branches and PLATING's broad readership.

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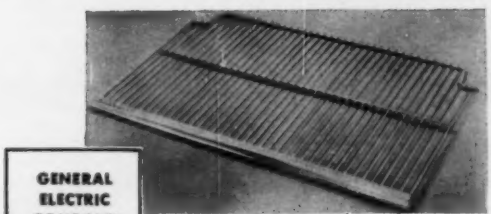
Iridite, in combination with other Allied Research processes, can provide a wide variety of finishes. As an example, Iridite 8-P applied to zinc or cadmium, followed by an application of Irilac, gives a highly attractive simulated brass finish.



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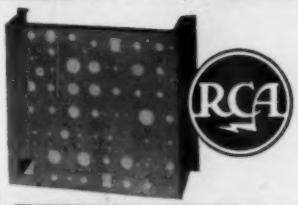

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Manor, Buffalo, N. Y., with 26 members and 5 guests in attendance.

Two new members were elected.

Harold Shapiro introduced the guests of the evening. Harold then outlined the program **Paul Conn, Chuck Fotheringham** and he have followed in contacting job shops and various manufacturing concerns in the area regarding employes who could benefit from AES membership.

George Wolf stated that the executive committee of the Technical Societies Council of the Niagara Frontier is well pleased with current progress on the Annual Science Fair to be staged April 19–21 at the Buffalo Memorial Auditorium.

The membership voted to submit to the Technical Societies Council the names of **Dr. C. J. Wernlund** and Harold Shapiro as outstanding members of the Branch. Awards will be presented by the Council to such members in recognition of the contribution they have made to their society.

Ray Kilroy announced that **Wally Keefe** who was confined to the hospital due to a coronary attack recently has returned home.

Recognition was given to **Boris Joffe** by President **Rolland Campbell** in behalf of the Branch for his translation of a number of foreign articles on plating.

Election of officers will be held at the April meeting and installation at the May meeting. Efforts are underway to secure a member of the National Executive Board to perform the installation duties.

The nominating committee is composed of Chuck Fotheringham, chairman, **Joe Ruff** and **Roger Brown.**

John Scholterer announced the executive committee recommends that the Branch bid for the 1966 National Convention. A motion was carried to submit a bid at the Interim Meeting.

After the business session our librarian, **Dick Davis,** introduced the speaker of the evening **Christopher Marzano,** chief chemist of the Amphenol-Borg Electronics Corp. who presented a very interesting talk on "How to Plate Difficult Metals."

Robert E. Lienert
Secretary

CAPITOL DISTRICT

Korbelak Speaks on Precious Metal Plating

The February meeting was held at the Circle Inn on Feb. 1. The dinner was attended by about 15 members.

The meeting was called to order by President **Hill** with about 30 members present. **Art Eisner,** chairman of the spring outing, announced Saturday, June 11, as the tenative date for the steak roast at Endries.

Robert Hill appointed a nominating committee consisting of **Robert Wolf,** chairman, Art Eisner and Fred Infield.

Two new memberships and a reinstatement were announced.

Two guests were introduced; **Scotty Williamson** of G. E. Research Lab., and **Dr. Sautter,** who is with the Watervliet Arsenal.

After the meeting a very interesting talk on Jet Age Precious Metal Plating was given by **A. Korbelak** of Sel-Rex. **Rene Sonnenfeldt** of Sel-Rex also attended the meeting with him.

E. LeGere
Secretary

CHICAGO

Barrel Finishing Presented by Walther

On Feb. 12, the Chicago Branch held their monthly meeting at Stella's Restaurant, 3206 North Kostner Avenue. Due to the bad weather, a small group of members were present at the meeting. The annual banquet was a tremendous success, the food was very good and the floor show superb. **Al Poe** and **Don Morris,** of the banquet committee, were given a vote of thanks for a job very well done. **Charles Geldzahler,** president, gave thanks to all the suppliers for their "hospitality suite." Four new members were voted into the Branch and four applications were turned over to Board of Managers for approval. **Larry George** is working out the details with the railroad for a special train to the convention in Los Angeles. Al Poe and the publicity chairman were appointed by Charles Geldzahler as tellers for the nominations of new officers at the next meeting. **Simon Gary,** librarian, introduced the guest speaker of the evening, **W. J. Walther** of the Roto-Finish Co. whose subject was "New Developments in Barrel Finishing—Equipment, Processes and Materials."

21 million spoons and 20 years ago...

... Reed and Barton, one of the country's leading silversmiths, installed their first Packer-Matic automatic polishing and buffing unit in 1939. 7 additional Packer-Matics were purchased as the years went by, production requirements rose and the first Packer-Matic proved itself.

"We haven't had a nickel's worth of trouble with any of our Packer-Matics, reports Mr. Henry C. Gill, Jr., Reed and Barton's Assistant Production Manager. The Packer people build them to work ... right ... and all the time."

The Model 5 double roll unit shown in the photograph went into service on May 24, 1939 and has been used for a variety of cut and color operations on the fronts and backs of flatware handles, spoon bowls and fork tines. Versatility is a must!

If you are in the silverware or flatware business, we can help. As a matter of fact, we can help you on any polishing, buffing, cleaning or deburring problem, whatever your line. Why not send samples along with your specifications or prints and let us show you.

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Mr. Walther discussed the Vibration process. Every surface, whether internal or external, is exposed to constant vibrating abrasive action. A vibratory motor is used to shake the tank and this causes the motion in all directions. The vibrations are from 1200–5400 per minute. The time for deburring is shortened considerably for example: A complex aluminum casting required a two-hour hand deburring followed by a 70-minute barrel tumbling to finish but when the Vibration was used for the same purpose, the time was cut to 15 minutes. The process increases production because the processing time is about 1/10 of barrel finishing, and also about five times less expensive. Mr. Walther showed slides of the machine produced by Roto-Finish and the parts that were processed in this manner. The parts were castings, impellers, connecting rods, transmission parts, cam shafts, forgings, etc. He also discussed the types of media and compounds used in the process. Following a question and answer period, Mr. Walther was given a vote of thanks for his informative talk.

Christopher Marzano
Publicity Chairman

CINCINNATI

Abrasive Discs Discussed by McWilliams

The Feb. 17 meeting was called to order by First Vice President **Leonhardt.**

Dave Kaplan gave a report on the progress of the Tri-State Meeting. All members were urged to get their ticket reservations in early.

Due to the Tri-State Meeting in April, elections for Branch officers will be held in May. The nominating committee, **Bill Gordon** and **Evans Foertmeyer,** will be under the chairmanship of **Ed Roof.**

The technical portion of the meeting consisted of a movie on Metal Finishing with Coated Abrasive Discs, followed by a discussion, presented by **Thomas McWilliams** of Behr-Manning. The movie illustrated many different applications of the discs and instructions on how to get the most out of the discs. Mr. McWilliams talked about a new approach to finishing stainless steel with silicon carbide abrasive belts to simulate chromium-plated appearance. A new development for the finishing of aluminum and stainless steel was presented: a wheel consisting of unwoven nylon fiber impregnated with emery. The meeting was closed with a question and answer period.

The group then adjourned to the social hour sponsored by the Behr-Manning Company, with **Howard Ricketson** and **Roy Alfers** as hosts.

David L. Kaplan
Secretary

COLUMBUS

Jund Explains Electropolishing

Regular meeting was held on Thursday, Feb. 4 with 33 present. The business portion included announcements of the coming Tri-State Meeting, the Columbus Council Banquet on Feb. 25, and the Interim Meeting in Philadelphia.

The Branch gave a vote of thanks to **Charles Murphy** who donated membership pins to the local Branch officers to encourage wearing of the pins by all members of the Columbus Branch.

Librarian **Hugh Miller** introduced the speaker of the evening, **Carl Jund,** The Globe Chemical Company, Inc., of Dayton, Ohio. Mr. Jund spoke on "New Facets of Electropolishing". His talk placed emphasis on the use of electropolishing of steel for functional purposes. His conclusions were supported by interesting case histories. The question period which followed his talk provided answers to questions on details of electropolishing and on its use for decorative purposes.

DALLAS-FORT WORTH

Max and Carr Speak at Electroforming Session

The Dallas-Ft. Worth Branch started the year off with a featured two-speaker Electroforming Conference. This vital subject, requested for presentation by many of the local aircraft and missile companies as well as electronic and semiconductor firms in the area, garnered an enthusiastic number of attendees. This January meeting, held in the Banquet Room at the Howard Johnson Turnpike Restaurant on Wednesday, Jan. 20 opened with a festive Texas-style fellowship hour. A short business meeting was called to order by Branch President

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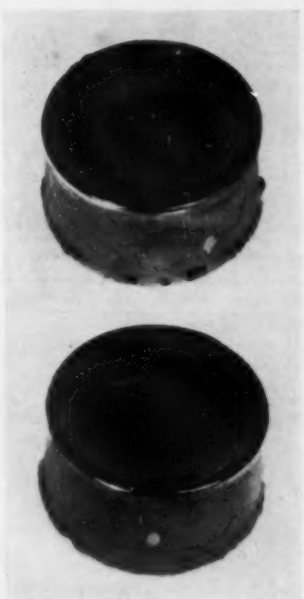

Request Bulletin SN-2

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Myron E. Browning with 46 members and guests present. Secretary **A. C. Fricke** read the minutes and introduced **Dr. Thomas C. Franklin,** associate professor, electrochemistry, Baylor University, a new member and a recent acquisition to the Branch Research committee. Program Chairman D. L. "Don" Allie presented the slate of spring meetings with discussion opened on the February Panel Meeting. Second Vice President **R. F. "Fred" Howard** suggested diversifying the panel meeting to include organic finishing pretreatments. This was endorsed by the members.

Program Chairman Allie introduced the speakers. **Dr. Dodd S. Carr,** Freeport Nickel Company of New York, presented his topic "Nickel Electroforming" using a variety of excellent visual examples. Specific bath properties were discussed in respect to characteristics of deposited metal. Types of mandrels and matrices most prevalent in use were reviewed.

Dr. Abraham M. Max, chemical and physical laboratories, RCA, Indianapolis spoke on "Electroforming and Electroplating in the Manufacture of High Fidelity Records". Dr. Max presented a very interesting sound-color movie depicting the complete history of the manufacture of high fidelity records. His presentation included newer techniques used to assure highest quality in electroforming record masters.

A lively question and answer session followed the presentations. A motion for adjournment was made by **Jack Haler,** seconded by **Jim Weaver,** and President Browning dismissed the group.

D. L. "Don" Allie
Branch Program Chairman

DALLAS-FORT WORTH

Preparation for Metal Finishing is Panel Subject

The February meeting was held in the Banquet Room of Howard Johnson's Turnpike Restaurant on Wednesday, Feb. 17.

Following the usual 6:30 Fellowship Hour, Branch President **Browning** called the meeting to order with 37 members and guests in attendance. Secretary-Treasurer **A. C. Fricke** presented the minutes and financial report.

Upon a unaminous vote of the Executive Council at their meeting one week earlier a special fund was started towards sponsoring the Branch in the Council of Scientific Societies (Dallas-Ft. Worth). Past President **E. R. Rinehart** was presented by First Vice President **W. L. "Bill" Aves** as the founder of the "Door Prize" Affair. **N. Rogers** of Bell Helicopter Corp. walked off with a beautiful precision fishing rod set.

Program Chairman **D. L. "Don" Allie** introduced the panel. E. R. Rinehart acted as panel chairman. The panel consisted of the following: John Lane, Lane Plating Works, Dallas, "Cleaning Prior to Chromium Plating"; E. R. Rinehart, Chance-Vought Aircraft, "Production Aircraft Plating Pretreatments"; Fred Howard, Bell Helicopter Corp., "Preparation for Organic Finishing"; A. E. Hohman, Chance-Vought Aircraft, "Organic Metal Pretreatments"; Doug Cox, Cox Testing Labs, "Importance of Analysis and Control"; Dr. T. C. Franklin, Baylor University, "Theoretical Aspects in Plating".

Each panel member presented a 10-minute dissertation prior to a general open meeting discussion. This meeting proved by far the most widely discussed and participated session the Branch has witnessed in several years.

Branch members from areas as far as Lubbock, Texas and Waco, Texas entered into the interesting discussion. **W. N. Renfro** and **Walt Nater** of Lobbock, Texas won special acclaim for their trip as members coming the longest distance, 300 miles!!

After a motion for adjournment made by **T. J. Foy,** seconded by **P. H. King.**

A. C. Fricke
Secretary

DENVER

Committees Formed; Beal Speaks on Alkaline Cleaning

The Denver Branch met Feb. 12 at the Oxford Hotel. Preceding the dinner an executive board meeting was held. There was an excellent turnout of 28 members for dinner and an overflow crowd of 50 members and guests at the meeting. We were very pleased to greet the large turnout from the Heiland Division, Minneapolis-Honeywell. During the business meeting **Bob Martin,** president, accepted volunteers for the Arrangements Committee, Program and Reception Committee, Branch Reporters, Publicity Committee, and Nominating Committee.

Following the business meeting **Sam Beal,** Oakite Products Inc. gave a speech on Alkaline Cleaning. Starting with early uses of alkaline materials for cleaning the speaker discussed present day additives and their purposes. The materials mentioned were phosphates, glassy phosphates, silicates, detergents, soaps, and colloids.

Elmer Schuster
Secretary

GRAND RAPIDS

Winters Presents Paper on Anodes

The regular monthly meeting was held at Scotties Restaurant in Grand Rapids, on Feb. 12, 1960.

Our president, **Don Smith,** opened the meeting by introducing several guests from out of town. Among them was **Earl Stadell,** of the Central Michigan Branch, who was instrumental in securing our speaker for the evening.

Jack Miller, publicity chairman of the local branch of the American Die Casters Society, invited our members to their Ladies Night scheduled for March 28.

Don Smith also reported that a recent subscription had been obtained to add to our list of Sustaining Members of the Grand Rapids Branch. American Musical Instrument of Grand Rapids, Michigan became our nineteenth Sustaining Member bringing the Grand Rapids group to the third highest nationally, for such members.

After a short business session the meeting was turned over to **William Griffin,** our educational chairman, who in turn asked **Bud Weiss,** our Sustaining Membership chairman, to introduce the evening speaker. Mr. Weiss prefaced his remarks by stating that he and the speaker for the evening were close personal friends, **Jack Winters,** president of Incar, Inc., and president of the AES, Cleveland Branch was our speaker for the evening. Mr. Weiss pointed out that Mr. Winters had been actively involved in many AES projects, including the teaching of electroplating courses in the Cleveland area.

Mr. Winters paper was entitled "The Anode Side of the Story." Mr. Winters began by relating that anodes in general are very much taken for granted by the average plater and are neglected as an unimportant factor as to their total effect on the results obtained at the cathode.

Mr. Winters expressed several basic

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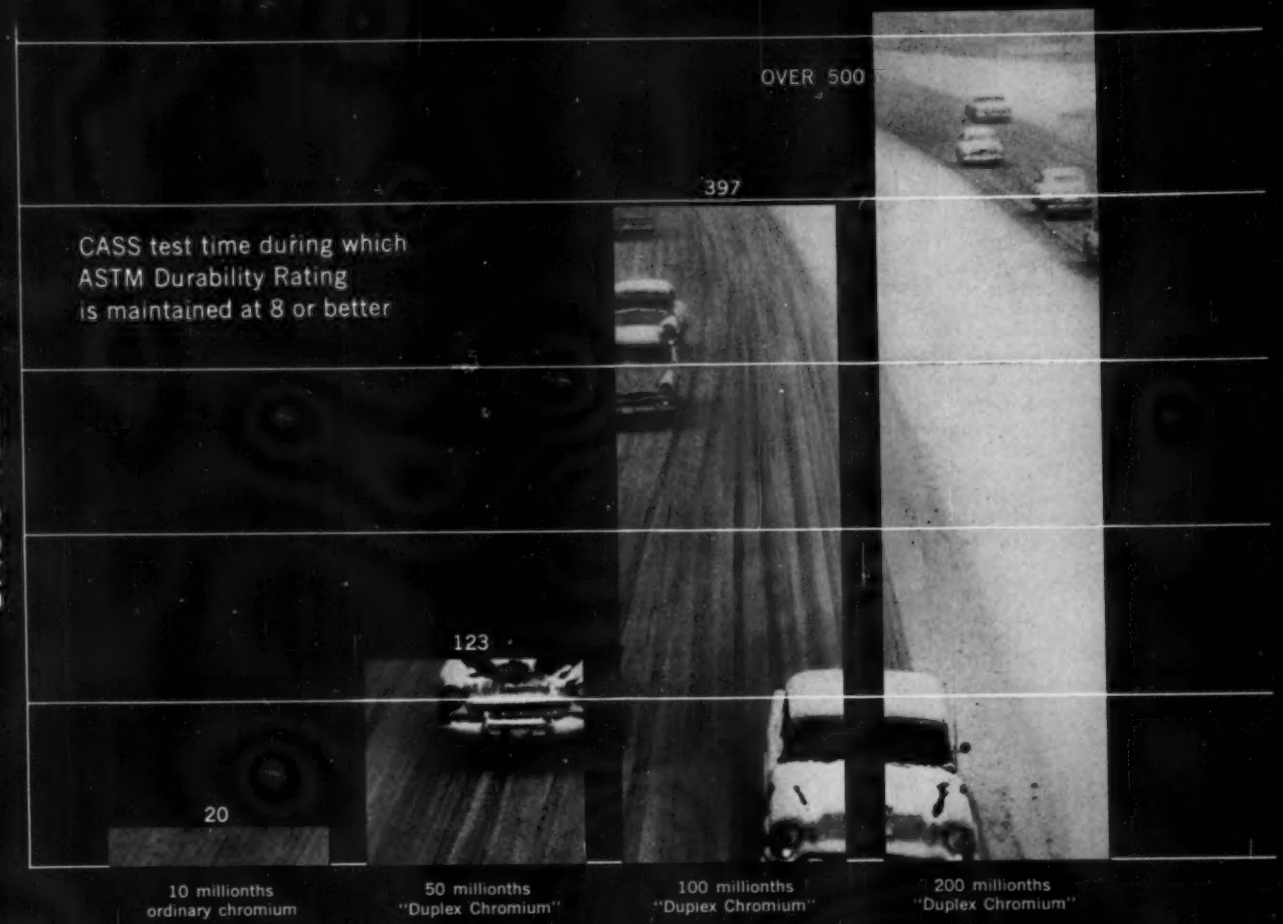

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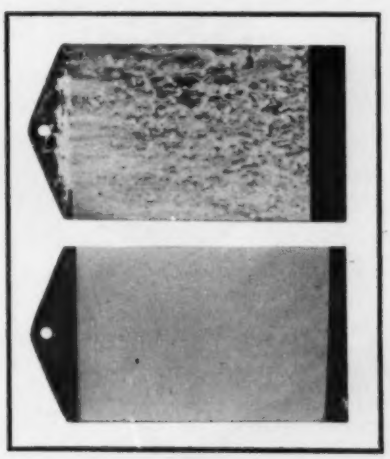

Zinc die cast panels after 272 hours CASS test. Both had same copper and dual nickel undercoats. Top panel, plated with 0.01 mil ordinary chromium gets ASTM rating of 0. Bottom panel, plated with 0.10 mil "DUPLEX CHROMIUM" still rates a perfect 10.

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concepts regarding the typical cell structure found in electroplating systems. He commented that in many instances such simple factors as anode bar cleanliness, sufficient anode size or capacity, and related factors were unobserved. He presented conditions for anode polarizations stating that the term as often employed was used incorrectly. Graphic examples were presented by slides to show instances where polarization was undesirable, such as in nickel, cadmium, zinc, cyanide-copper etc., but where, in the case of alkaline tin, polarization was an important part of the anode story. Mr. Winters stated that polarization in most cases could not be related to either visible or invisible films thought to be observed on anode systems.

He emphasized the use of the fundamental instruments available to electroplaters, such as the ammeter, stating that the first indication of polarization would be manifested by a drop in current. Depending on the bath, further effects of polarization would be a drop in *p*H, in nickel plating systems, for example, or destruction of caustic in most of the alkaline cyanide plating baths. Mr. Winters presented examples of poor current distribution as affecting parts near the bottom and end of unlined tanks and emphasized the need for proper distribution of anodes to obtain as even overall current density as possible.

Mr. Winters subject matter was well received, thoughtfully presented and emphasized in such a manner as to be unmistakable in its intent.

O. D. Hoxie
Second Vice President

HAMILTON
Modern Tumbling Described by Orlich

On Dec. 18, 1959, the Hamilton Branch held their monthly meeting at the Fischer Hotel, York Street, in Hamilton.

The meeting was called to order by the President **K. J. Taylor** at 8.15.

E. K. Cranfield reported that the proceedings for 1958 were now in the hands of the chief librarian of the Hamilton Public Library.

President Taylor introduced the speaker of the evening **W. Orlich** of Tumbling Sales & Service who talked on Modern Tumbling Methods, liberally illustrated with samples of work done in their own job shop in equipment that they supply to the industry. After a question and answer period, Mr. Orlich was thanked by E. K. Cranfield, and the meeting adjourned for refreshments.

Attendance was 46 per cent.

Earl K. Cranfield
Reporting Secretary

HARTFORD
Winters Discusses Cadmium and Zinc Plating

The regular meeting was held at the Veterans of Foreign wars building in Elmwood on Feb. 15 and the number of members and guests present was 42. Preceding the meeting a colored movie entitled "Corporal Missile" was shown.

The guest speaker for the evening was **John B. Winters** of Incar, Inc. whose subject was "Bright Cadmium and Zinc Plating".

Mr. Winters pointed out the differences in covering and throwing power: Covering power is the ability to plate over a metal and is influenced by the shape of the part, the base metal, its surface condition and addition agents in the bath. Covering power is good on copper base metals but becomes poorer in this order: cold rolled steel, hot rolled steel and malleable iron. Cyanide zinc solutions have poor covering power which is not quite as bad in cyanide cadmium baths. Overpickling increases the surface area of a part and causes smut which becomes hard for zinc to cover. Cadmium will plate over this smut but may blister later.

Throwing power, the ability to plate uniformly over a metal, is good in zinc baths. The influence of metal content, caustic soda, brightener content, etc. was discussed in relation to throwing and covering power for both zinc and cadmium baths.

The technical chairman for the evening was **Robert Tiers.**

Stanley Platoz
Secretary

INDIANAPOLIS
Thomas Talks on AES Research

Forty members of the Indianapolis Branch turned out for the Feb. 2 meeting at Construction League. An excellent steak dinner was enjoyed. With President

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Les Reynolds presiding, introductions were called for, followed by the secretary's and treasurer's reports. Under old business, **Robert Smith** reported that our charter had been removed from our former meeting place and brought to the present one. This will be hung in the outer hallway. **Robert Bruck** reported on the Tri-State meeting of April 23 at Cincinnati. Tickets are available now for the dinner. The educational session will have five papers given with Duke Wysong, national president, presiding. Announcement was also made about the Interim meeting of Feb. 19 at Philadelphia.

Under new business our president announced that Radio Corporation of America in Indianapolis is a new sustaining member.

One membership application was presented. It will be considered and voted upon by the board of managers at the March meeting.

Doug Thomas, chairman of the national research committee, was our speaker. He was introduced by **Mark Trook,** librarian. Mr. Thomas told us many points of interest in our bylaws, what it means to belong to the Society, and many things about the research going on all the time. He told how the various research projects come about and that much effort and study is made before projects are selected.

The budget this year is $50,000 for research. Sustaining memberships are vital to the program as they are the only means of support for the various projects. Four times each year every member gets a report on the research work from the committee. Forty-one serial reports havbeen released to date. The committee is approved by the executive board of the society and consists of nine members. Mr. Thomas told of seven of the projects which are in research at the present time. His many interesting facts and comments make members feel they are a part of the Society, when we know what is going on—and why.

Edna Rohrabaugh
Secretary

MIAMI

Branch Hears Talk on Safety

The February meeting was held on Friday, Feb. 19 at 5000 East 10th Court, Hialeah, Florida.

The guest speaker of the evening was **Jack Meisner** of the Miami Division of the Florida Industrial Commision, Department of Industrial Safety.

He advised the group that his division was ready to start courses at anytime that there was a sufficient number of people interested in the study of industrial safety and elimination of hazards.

The theme of the speech was "Safety Through Education".

It is the feeling of industrial safety engineers that safety cannot be accom-

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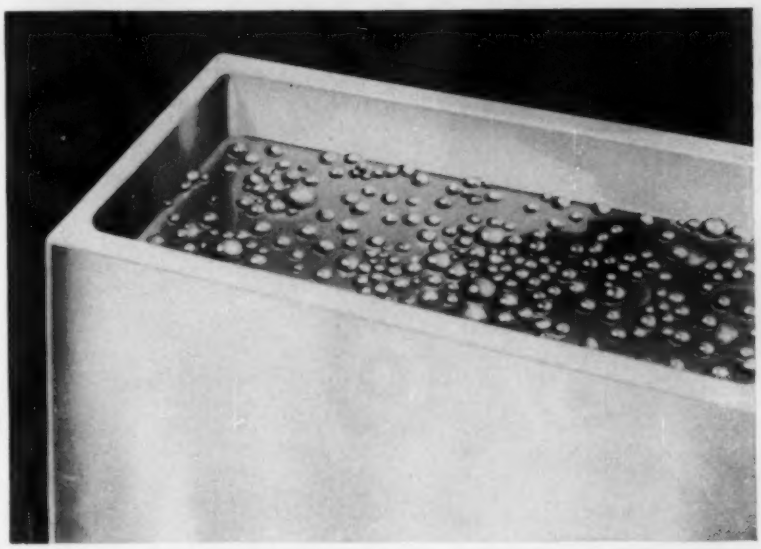

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Frank X. Marinello
Secretary

MILWAUKEE

Corrosion Testing Presented by Schmidt

The 505th regular meeting on Feb. 5 of the Milwaukee Branch at the Ambassador Hotel was called to order by President Cy Taterczynski.

Two applicants were accepted into the Branch.

The following members were appointed to the Annual Meeting Committee: **E. H. McCoy,** chairman; **F. Anderson,** tickets; **H. Tessman,** entertainment; **E. Ratterman,** hotel; **E. Smith,** luncheon; **G. Piellusch,** publicity.

The chair announced that **Les Diveley** was re-elected as chairman of the Midwest Council.

Gene Piellusch introduced **Henry Schmidt,** director of research and development for Industrial Filter and Pump Mfg. Co., Chicago. Mr. Schmidt presented a talk entitled, "Corrosion Testing". Mr. Schmidt brought up-to-date results of a research project covering salt spray testing.

Frederick F. Padgett
Secretary-Treasurer

MISSISSIPPI VALLEY

Metal Cleaning Subject of Carlson Presentation

The January meeting of the Mississippi Valley Branch was held at the Moline Legion Hall. There were 21 present for the dinner preceding the meeting.

President **Dennhardt** presided and after the reading of the minutes and the financial report by the secretary, opened the meeting to discussion of locating a new place to hold our meetings. After the discussion it was decided to hold the February meeting at El Rancho Tel in Bettendorf, Iowa.

President Dennhardt reported on the Midwest Regional Educational meeting held at Rockford, Ill.

Librarian **Charles Horton** introduced the speaker of the evening, **Paul R. Carlson** of the materials engineering department, of Deere & Co. whose subject was "Cleaning Metals Before Painting". Mr. Carlson's talk, illustrated with slides, covered the methods used at his plant in finishing farm equipment.

Clyde Shepherdson
Secretary

MISSISSIPPI VALLEY

Gilbert Talks About Plating Specifications

The Feb. 16 meeting of the Mississippi Valley Branch was held at El Rancho Tel in Bettendorf, Iowa. After the dinner, President **Dennhardt** opened the meeting for business. One membership application was accepted.

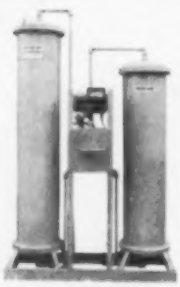
It was decided to hold the March meeting at the Moline Legion and to decide then whether to change our meeting place.

George Parisho gave a short talk on membership, ways of greeting new members and ways of keeping old ones.

The nominating committee presented the following slate: **Al Dennhardt,** president; **Wilbur McKay,** Vice-President; **John Miller,** Second vice-president; **Clyde Shepherdson,** secretary-treasurer; **Kermit Wolff,** librarian; **L. O. Gilbert,** assistant librarian.

The meeting was turned over to Librarian **Charles Horton** who introduced the speaker, **Lloyd Gilbert** of the Rock Island Arsenal. Mr. Gilbert's subject was "Plating Specifications from the Viewpoint of the Plater, the Designer, the Inspector and the Purchasing Agent."

Clyde Shepherdson
Secretary



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MOHAWK VALLEY

Slaght Speaks on Vinyl Coatings

President **Jack Benson** chairmanned the Jan. 14 meeting at the Golden Tea Pot Inn, New Hartford, N. Y. with 20 in attendance. He reported that **Chuck Raehm,** a past Vice President of our Branch, was in town for a few days.

Robert Stewart introduced the speaker for the evening **Emery Slaght** and his associate Mr. Driscoll of Stanley Chemical Co.

Slaght stated many types of plasticizers can be combined with vinyl resin to form a tough and chemical resistant coating. The vinyl resin dissolves at 350 F. Rack coatings are heated to 385 to 400°. A slight discoloration on rack coatings is not a sign of faulty baking but rather a desirable condition. He also stated that best adhesion is obtained with a good primer. The coating can be sprayed or dipped as conditions call for.

He cited only a few of the many uses of this material such as coating handles of tools, linings for tumble barrels, overshoes, dolls, bulbs, sponges, coating fish lines, belting, etc.

The secretary presented an application for membership.

Henry J. Crouse
Secretary-Treasurer

MONTREAL

McAleer on Buffing and Polishing

The Montreal Branch at its regular monthly meeting held on Feb. 8 had one of the finest turnouts this season. The members were given an excellent educational session on Compounds, and Buffing and Polishing Wheels by **H. J. McAleer,** president of Formax Corporation of Detroit. Mr. McAleer was thanked on behalf of the Montreal Branch by **G. R. Davidson.**

Another new member was welcomed into the Branch. After a very short business session the meeting was moved adjourned at 10:30 p.m.

R. W. Niggemann
Secretary

NEWARK

Harper and LaManna Present Papers

President **Fred Meyer** called the Feb. 19 meeting to order at 8:30 p.m.

Two applications for membership were received. One new member was elected.

The nominating committee presented the following slate of officers for 1960–1961. For president, **John Banta;** first vice president, **Al Korbelak;** second vice president, **Howard Martin;** secretary, **Don Foulke;** treasurer, **George Wagner.** Board of Managers, Messrs. **Bittrich, Grigat, Meyer, G. Reuter** and **Struyk;** delegates, Messrs. Foulke, G. Wagner and **Wesley,** and alternate delegates, Messrs. Grigat, Korbelak and LaManna.

President Meyer then called for nominations from the floor. Mr. **Cullinane** made the following nominations which were seconded by Mr. **Azzolino.** For president, **Dodd Carr,** first vice president **Herb Tilton;** second vice president; **Bill DuFosse;** alternate delegates, Messrs. Carr and Tilton.

Edward T. Faint, who is now 91 years old, wrote to **Howard Cobb** to explain that he now lives in Lewisburg, Pa. and could not come to the meetings. However, he wished the Branch well, and hoped that it was still growing in wisdom and dispensing knowledge as well as good fellowship.

President Fred Meyer announced that the Executive Committee of the Branch had selected F. J. LaManna as our choice to receive the Charles Proctor Award. His name will be submitted to the National Society.

Al Korbelak then introduced Cy LaManna whose timely topic on "Barrel Plating" was quite complete for the limited time available. He discussed degreasing, pickling, and plating conditions, as well as the size and types of loads necessary for good plating as well as barrel protection. He mentioned the use of "load

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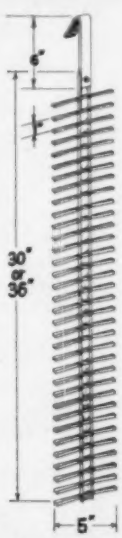

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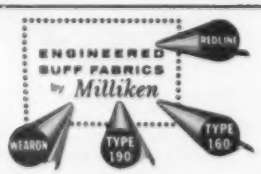

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460 INDICATE A 457.

breakers", "floaters" and contact cleanliness, as aids in mixing the work as well as to establish good contact, all of which is necessary for satisfactory specification plating. His talk was supplemented with the exhibition of two types of small working barrels.

J. F. Harper of Harper Buffing Machine Co. began by indicating that automatic buffing machines had cut the labor costs of buffing but not the material costs, which are quite significant. He claims that his machines could reduce costs one-fifth to one-tenth.

He showed that in the conventional method of barrel burnishing, the work as it tumbled received relatively little pressure from the media, and hence required a long time for burnishing. In order to increase this pressure, he rotated at least two barrels about a central axis, thereby creating a centrifugal force in both barrels. This in turn allowed the media to extend a greater pressure on the parts to be burnished. Hence burnishing times was reduced.

He discussed, in general, the types of media, abrasives and lubricants, employed; wet and dry tumbling; and indicated that both very light and delicate parts as well as relatively heavy parts could be buffed in this manner. In fact, the work as removed had a high degree of polish as attested by the number and types of specimens on display.

This lecture was amplified by both sketches and slides. It was generally agreed that his products have a place in the metal finishing industry.

Gustav Bittrich
Acting Secretary

NEW YORK

Last minute space shortage at press time prevented use of the following credits in the story concerning the New York

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So as to expedite review and other processing, please write the Editor, PLATING, 445 Broad Street, Newark 2, New Jersey, for full particulars before submitting your manuscript.

Branch's successful Annual Technical Session and Banquet at the Statler Hotel, New York, February 7, 1960, published in PLATING MAGAZINE'S March issue:

Leadership of the New York Branch in its fifty-first year includes Joseph T. Rembecki, president; Jack Weiner, first vice president; Arthur E. Carlson, second vice president; Milton Nadel, secretary-treasurer and M. H. Pollack, librarian. Its accredited Delegates are Messrs. Rembecki, Nadel and Angelo Amatore, with Arthur Carlson, Philip Bruno and George Herrman as Alternate Delegates.

PHILADELPHIA

Anniversary Celebration and Interim Meeting

This report covers the 50th Anniversary Celebration of the Philadelphia Branch held on Feb. 19 and 20 in conjunction with the AES 7th Interim Meeting.

Friday afternoon, Feb. 19, 23 members and guests toured the United States Gauge Div. of the American Machine & Metals, Inc. Sellersville, Pa. plant. Here they saw fully automatic painting, polishing and plating equipment in operation, as well as a hand operated plating and anodizing section doing all modern plating operations, including precision gold plating. One feature of the plating department was the completely intergrated waste treatment system that eliminated all acids, cyanides and chromium wastes from the public sewer system.

The Friday evening technical session got under way at 8:15 in the Betsy Ross Room with about 50 present. Branch President **Cogan** opened the session, using the gavel in use by the Branch since its founding on Sept. 30, 1910. Branch Second Vice President **Irvin Hauseman** delivered the invocation in which tribute was paid to the founding fathers of the Branch. After the introduction of the AES Executive Board, AES President **Wysong** congratulated the Branch on its 50th anniversary. Mr. Cogan asked out-of-town guests to introduce themseves; **Frederick Fulforth** and **Dr. Samuel Heiman,** AES Past Presidents from Philadelphia were presented; Mr. Cogan read the names of Philadelphia Branch members prominent in National Society affairs.

Dr. Samuel Heiman as co-chairman of the Educational Sessions Committee introduced **Dr. W. Andrew Wesley,** International Nickel Co. and AES First Vice President, whose topic was "The Search for the Causes and Remedies for Corrosion of Nickel-Chromium Coatings." Dr. Wesley stated that the search for the basic causes of the corrosion of nickel-chromium coatings had shifted the emphasis somewhat from nickel as the cause to the position that the behavior of chromium in the system had become suspect. He showed on slides several potentials/*p*H equilibrium diagrams for nickel and chromium to show relationship of corrosion to changes in *p*H and potential. Another slide illustrated how a crevice with pure water becomes self-stifling; with an electrolyte, the crevice corrodes due to lowering of *p*H.

Another theory of corrision is based on edge dislocation, due to defect in the atomic lattice. A coalescence of dislocations bunches these in one location causing pitting.

Dr. Wesley gave the following remedies to lengthen coating life:

1. The detour principle, which will cause pit to broaden, rather than go directly to basis metal. The use of double nickel is one means to promote the detour effect.
2. Interpose a layer of another metal that is cathodic to the top layer, such as chromium/nickel/chromium.
3. Less stress in the deposits.
4. Select best basis metal to change stress in chromium deposit. (The work of Blum, Barrows and Brenner in 1931 showed steel to be the pocrest base for porosity in deposits; brass was medium; copper and nickel were much better.)

Dr. Wesley said that stress in the nickel affects stress in the chromium and that thickness is the key one way to lengthen coating life.

The second speaker was **John B. Winters,** Incar, Inc., whose topic was "Bright Zinc and Cadmium." Mr. Winters defined "throwing power as the distribution of thickness; you cannot see it, you have to measure it. "Covering power" was defined as the property of a plating solution to produce a deposit in recessed areas; you can see it.

In discussing the effect of the base metal of covering power, Mr. Winters said that a listing would place copper as good, followed by cold rolled steel, hot rolled steel and malleable iron in descending order. Overpickling with resulting surface roughening causes high surface area that requires greater currents to be used. As an example of this, Mr. Winters stated one square foot of area that is smutted can increase the area to four square feet. The effects of stray currents on plate distribution were discussed and remedies to overcome this unlined steel tanks were given.

Mr. Winters stated that sludge on tank bottoms may produce pitting on the bottom pieces suspended in the plating solution. He said that unequal anode distribution produced unequal current distribution on the racks of work.

Following these general remarks, Mr. Winters gave formulas for zinc and cadmium solutions and discussed in detail

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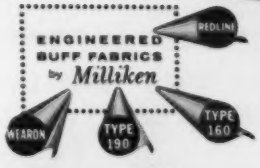

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the effects variations in each constituent and operating condition had on the deposit characteristic. In the preparation of cast iron for zinc plating, acid should never be used—an alkali derusting compound was excellent.

The Saturday Educational Session was opened at 10:20 a.m. by Dr. Samuel Heiman with 55 in attendance. In the absence of the Branch Secretary, who was attending the Interim Meeting, **Allen M. Frank** made notes of this session.

The first speaker was **Russell V. Vanden Berg,** Aluminum Company of America, whose subject was "Anodizing and Chemical Finishes of Aluminum." He stated in describing anodizing, it was a growth process of aluminum oxide on the aluminum, starting with a boundary layer. The anodic coating consisted of three structures: outside, sponge-like center structure and boundary layer between the aluminum and oxide. Mr. Vanden Berg described four basic types of commercially used anodic coatings: 1) Boundary layer, where there are no growth possibilities, as obtained with chlorates and tartrates; 2) Hard coating—contain more oxide; 3) Soft spongy—contain more air, less oxide; 4) Electrobrightening, an anodic oxidation procedure that removes the oxide as fast as it is formed. A slide showed the cellular structure of the anodic film at 35,000 magnification. The cell size was determined by the operating voltage—the higher the voltage, the larger the cell size. Phosphoric acid has a high anodic solvent action and gives the largest pore size; the smallest pore size, produced by sulfuric acid, makes this acid best for high corrosion resistance anodic films. He discussed the colors imparted to the anodic coating by the various alloying constituents found in aluminum.

Under chemical finishes, discussed were matte etching and chemical and electrochemical brightening. Given as the three basic methods of coloring aluminum were: the coloring of the basic alloying elements by the anodic process; the adsorption of water solutions of organic dyestuffs into pores of the anodic coating; the use of mineral (inorganic) pigments.

The second speaker was **Dr. Harold J. Wiesner,** Bendix Aviation Corp., whose subject was "Hard Anodizing." Dr. Wiesner gave a comparison of four processes available: Alumilite, Martin, Hardas and Sanford. Operating temperatures varied from 0–52F, current density from 12–300 ASF, d-c voltage—10 to 150 v. The most used alloy was 6061. He gave as one method to produce a hard coat, the practice of Bendix to produce first a thin hard coat, seal, and then apply a thick hard coat. Typical practical applications were: Hard coating of copper alloys for high temperature utilization; the replacement of steel parts in fuel meters by hard coated aluminum with a 2/3 reduction in weight.

The final speaker was **William K. Murray,** Enthone, Inc., who spoke on "Plating on Aluminum." Mr. Murray gave several reasons why aluminum was plated, among which were: increased hardness; improved solderability; lowered electrical contact resistance; match other parts plated with decorative finishes, such as nickel/chromium, brass; promote anti-seizing and anti-falling; lowered friction between moving parts; bonding of rubber to aluminum. Described in detail was the process to plate aluminum: racking of the parts, precleaning, etch cleaning, acid dipping to remove alloying constituents, zinc immersion coating from a zincate solution, copper plating, final plating. In producing nickel/chromium, a non-etch cleaner is used over the polished aluminum and nickel plated from a suitable solution is applied to the zincate film.

The session concluded at 1:05 p.m. Following lunch, at 2:30 a film produced by the aluminum Company of America "Color and Texture" was shown.

The evening activities started with a cocktail reception at 6:00 sponsored by 12 members of the Metal Finishing Suppliers'

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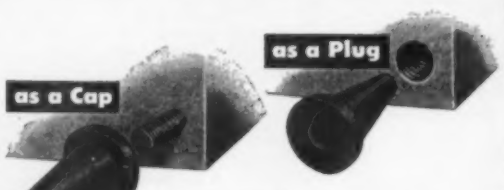

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Association. At 7:15 more than 430 were served a filet mignon dinner in the Crystal Ballroom. During dinner, lucky ticket holders received door prizes. Following dinner, an excellent floor show was given, concluded with dancing until 1:00 a.m.

The Philadelphia Branch offers sincere thanks to all who made possible this wonderful 50th Anniversary Celebration: the AES for holding the Seventh Interim Meeting in Philadelphia at this time; the speakers who presented papers at the Educational Sessions; the Metal Finishing Suppliers' Association members who sponsored the cocktail reception; the many advertisers in the program book; the donors of the door prizes; American Machine & Metals, Inc. for the plant tour; the Benjamin Franklin Hotel for complete cooperation in providing all of the many facilities required.

I. Wm. Marcovitch
Secretary

PHOENIX
Metal Cleaning Discussed by Beal

The regular monthly meeting was held Tuesday, Feb. 9, at the Armed Services Officers' Club, 3334 E. Camelback. After the usual social hour and dinner, the business meeting was called to order by **Bill Griff** at 7:30 p.m. A committee meeting of those concerned with the March symposium will be held at the Outpost Monday, Feb. 15.

George Carlton invited members to attend the ASM social meeting at Bud Brown's Barn and suggested a future joint meeting with ASM.

We will receive the MFSA Award of $100.00 by May.

Our approved by-laws have been forwarded to the Supreme Society.

Members were urged to get their reservations in soon for the Los Angeles Convention.

Librarian **Paul Wible** introduced our speaker, **Sam Beal,** of Oakite, Inc. The members appreciated the informative talk on an important subject—"Fundamentals of Metal Cleaning."

James E. Weaver
Secretary

PROVIDENCE-ATTLEBORO
Murray Discusses Spotting Out and Tarnishing

The Christmas Party was held at the Wayland Manor, Providence, on Dec. 8, 1959.

The January meeting on the 18th was held at the Providence Engineering Society Building at 195 Angell St.

William Murray of Enthone, Inc. discussed "Prevention of Spotting Out and Tarnishing".

In addition to the usual causes, porous basis metals, dirty rinses and poor drying techniques, he discussed the new and old passivating treatments.

Edward A. Parker
Secretary

ROCHESTER
Saltonstall Presents Paper; Beuckman Candidate for National Office

The Feb. 4 meeting of the Rochester Branch was called to order by President **Anthony Cottrone** at the Rochester German Club.

A committee, consisting of second Vice President **John Cippola** and **Vern Schaeffer,** was formed to express the sympathy of the Rochester Branch when death occurs in a member's family.

An invitation was extended to the members to attend the Empire Regional Meeting to be held in Elmira in April.

A committee consisting of Emil Pottridge, John Cippola and Charles Fideor was chosen to investigate the merits of changing the Branch's social calendar to either or both a Christmas Party and a Spring Dinner Dance.

The announcement of Past President **Frank Beuckman's** candidacy for third vice president of the National Society was received with great enthusiasm. The Branch has pledged its full support in his behalf.

Following the business portion, the meeting was turned over to Librarian **Frank McNutt** who introduced the speaker, **Dr. Richard B. Saltonstall** of the Udylite Corporation, who spoke on "The Role of Agitation in Electroplating."

At the conclusion of Dr. Saltonstall's very interesting talk, refreshments were served through the courtesy of **Tye Moffatt,** area representative of Udylite.

Barrie M. Gardner
Secretary

ST. LOUIS
Rice Illustrates Talk With Color Movie

The regular monthly dinner meeting was held at the York Hotel with 19 mem-

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bers and guests present for dinner. There were 28 members and guests present when President **William Piel** called the business meeting to order.

Communications consisted of the letter announcing the Philadelphia Interim meeting. There were no applications for membership. The school was reported going well with 31 enrolled. They expect 25 next term.

The entertainment committee reported that the 10th annual spring banquet would be held May 7 at the Ambassador Hotel. Five hundred people can attend. In the past we had to limit the attendance to 360. A steak dinner will be the menu. Bobby Swain will furnish the music as before and the price will be $10 per ticket.

Andy Julius and **Bill George,** two of our delegates attended the Chicago banquet and the Midwest Regional meeting. Andy also reported that we are being asked to name the headquarters hotel for the 1964 convention. It was decided that the decision could not be made until we know for certain whether the exposition will be held here that year. Andy Julius will endeavor to work this out at the Philadelphia Interim meeting.

The secretary was instructed to prepare the papers recommending **Ed Sertl** for the Charles Henry Proctor Achievement award. A suggestion was made that 150 extra copies of the meeting announcements be printed. These would be mailed to managers of companies and asking that they try to persuade some of their personnel to attend the meetings.

Librarian **Richard Gotsch** introduced **James Rice,** product engineer for Behr-Manning Company. His talk entitled Off Hand Finishing With Coated Abrasive Belts was accompanied by a 16mm color sound movie which gave a brief description of how coated abrasive belts are used in metal finishing industry. A question and answer period followed. The meeting was adjourned with a rising vote of thanks to Jim for his talk.

Ward W. Kelly
Secretary

SAN FRANCISCO

Missel Speaks on Berryllium Plating

The January 14 meeting of the San Francisco Branch was called to order by President **Trevor Harry.**

We had three guests present which were introduced to the members by **Richard Coen,** first vice president.

Our guest speaker, **Leo Missel,** was introduced by Mr. Harry. Mr. Missel presented a talk on the latest technique for cleaning and plating beryllium.

The post-Christmas attendance was low and the business meeting was postponed till February.

C. E. Snelgrove
Secretary-Treasurer

SAN FRANCISCO

Bellinger on Trouble Shooting

President **Trevor Harry** presided at the Feb. 11 meeting.

Introduction of guests was performed by Second Vice President **Stan Bamman.** Forty-five persons were present.

Murray Hart, Branch Librarian and Educational Chairman, introduced our guest speaker Kenneth Bellinger of Conversion Chemical Corp., who spoke on "Trouble Shooting in the Plating Shop". Following the talk there was a stimulating discussion on plating troubles.

Our monthly drawing was won by **Don Pierce.**

Three sergeants-at-arms were nominated and elected by the membership: **Duane Heinlen, Elston A. Flores, John Tracy.**

At the business meeting the following points were discussed:

1. Possible forming of AES Regional Group.
2. Distribute AES Booklet designed for membership increase.
3. Elect candidate for "Charles Henry Proctor Memorial Leadership Award."
4. Distribute circular on Robert Girard for nomination as National Third Vice President.
5. Entertainment Committee work on new activities other than AES meeting.
6. Re-examine Delegates intentions for National Convention.

A Bon Voyage note was sent to **Ed Schultz** longtime San Francisco member who has transferred to Pan American World Airways, Idlewild Airport, New York.

C. E. Snelgrove
Secretary-Treasurer

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SEATTLE-PUGET SOUND

Plating Room Troubles Discussed by Bellinger

The February meeting of the Seattle-Puget Sound was held on Monday, Feb. 8, at Andy's Diner, 2963 4th Avenue South, Seattle, Wash.

After a short business meeting, Kenneth Bellinger of the Conversion Chemical Corporation gave a very interesting discussion of "Trouble Shooting".

Mr. Bellinger has had wide experience around the metal finishing field and could very graphically describe troubles he would be called to correct. After a very lively question and answer period covering some local trouble questions the meeting was adjourned.

During the short business meeting preceding the speaker, President **Joe Rouleau** mentioned the wonderful Christmas party that was held on Dec. 17. Members and their spouses were entitled to refreshments, dinner and an evening of entertainment by showing a paid or current dues card at the door.

As a result of the Christmas party only three members are not paid up at this time.

Helen Archibald
Secretary

SPRINGFIELD

Sonnenfeldt Compares European With American Plating

The Springfield Branch met at Blake's Restaurant for the Feb. 29 meeting. There was quite a large turnout of members and several guests.

Wayne B. Sanders, chairman of the Activities Committee, gave a report on the Turkey Shoot planned for March 10 at the Agawam Sportsmans' Club. The event promises to be well attended.

The Branch secretary gave a report on the calendar of meeting dates prepared by the Valley Council of Technical Societies, of which the Springfield Branch is a member organization. An announcement was also made on the writeup of the Waterbury Branch with pictures as printed in the Waterbury newspaper, which was reprinted by the National Headquarters and distributed to the Branches. Information was also given on the Providence-Attleboro Branch Seminar that is planned for May, and several members expressed interest for additional information.

President **Elery C. Gibson** appointed a nominating committee consisting of; **Edward F. Koetsch Jr.,** chairman, assisted by **John E. Costigan** and **Laurence Fountain.**

With the business portion of the evening completed, the meeting was turned over to Librarian **Louis E. Dupuis,** who, after giving the background of the speaker, introduced **Rene Sonnenfeldt** of Sel-Rex Corp.

Quite informally, Rene proceeded to outline his subject, "European Versus American Plating". With a bit of humor, methods and operations from various countries were compared to the way the same procedures are generally handled in this country. Everyone listened infently, and after the many questions were answered, Rene was given a standing ovation by the entire group present. Although not too technical, the topic was of much interest, and the speaker was well versed, as evidenced by the lack of notes. The general comment was: "How about more speakers like him on subjects like that."

Henry L. Heissfeld
Secretary

TORONTO

Nutting Talks on Electro Cleaning; Wells on AES Research

The Toronto Branch held its monthly meeting Feb. 12 in the Alberta Room of the Royal York Hotel. Dinner attendance was 23 and meeting attendance 33.

John Harden introduced the speaker, **G. E. Nutting** of Wyandotte Chemical, who gave a very informative talk on electro cleaning and its development through the years. A question and answer period followed and the speaker was thanked on behalf of the Branch by **Harold Jones.**

Kergan Wells reported that he would be attending the Interim Meeting in Philadelphia. He also reminded the Toronto Branch about the activities of the AES Research Program. This was followed by a report given by **Herb Skelton,** on the work being done to interest industry in this research.

The dinner draw prize was won by **Gord Lince** and the door prize by Kergan Wells.

G. A. Lince
Executive Vice President

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Buffalo: A. J. Neubauer, L. Walczak
Capitol District: F. W. Quackenbush, V. P. Greco, M. N. Opar
Columbus: M. S. Drake
Denver: W. L. Miles Jr.
Grand Rapids: V. Naimo, R. D. Elsner
Miami: H. W. Long Jr.
Melbourne: J. Jenkins, D. M. A. Schultz, W. K. Mullett, D. W. Trimble
Milwaukee: A. A. Schaut, H. C. Skarpmoen
Mississippi Valley: F. M. Burney
Mohawk Valley: J. A. Howard, W. H. Byron, R. Krawczyk
Montreal: G. A. Katronge
New Haven: F. A. Parnell Jr., C. E. Covey, J. Bevacqua, A. B. Smith, J. R. Field Jr., K. D. Miller Sr., W. R. Schmidtke, P. De Bernardi
Philadelphia: C. D. Butera, E. A. Erickson, J. J. Hagans, E. R. Hart, S. Nochin
Providence-Attleboro: A. DiMario, L. Giusti, D. Goff, J. Newman, J. S. Kidd Sr.
San Francisco: S. Schroder, M. M. Patterson, P. Ignacz, R. P. Lothrop, W. S. Pankey
Seattle-Puget Sound: R. P. McMonagle, S. Frye
Southeastern: W. J. Miller
Syracuse: M. T. Lawlor
Waterbury: J. R. Seppies, C. F. Foster
Member-at-Large: I. G. F. Walker

REINSTATEMENTS

Melbourne: G. W. Bloor, J. H. Flavell, J. C. Parkin
Mississippi Valley: A. Enright, J. Doss, M. Hitch
Mohawk Valley: B. A. Tisi
New York: R. Operowsky
Philadelphia: J. E. O'Brien
Pittsburgh: R. Reynolds
San Francisco: R. Teffa
Seattle-Puget Sound: A. Davis
Syracuse: D. J. Costello
Member-at-Large: W. J. Bierens, R. C. Borrowman, A. H. Smith, H. M. Cherry

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April 8-9, 1960—**Executive Board Meeting,** National Headquarters, Newark, N. J.

April 9, 1960—**Baltimore-Washington Branch,** Annual Banquet and Dance, Presentation of the "Order of the Pot," Park Plaza, Baltimore, Maryland.

April 22, 1960—**Editorial Board Meeting,** Sheraton-Gibson Hotel, Cincinnati, Ohio.

April 23, 1960—**Sixth Tri-State Regional Meeting,** Cincinnati Host Branch, Sheraton-Gibson Hotel, Cincinnati, Ohio.

April 23, 1960—**Twenty-First Annual New England Regional Meeting,** Bridgeport Host Branch, Hotel Statler, Hartford, Conn.

April 28-29, 1960—**Research Committee Meeting,** Mark Twain Hotel, Elmira, N. Y.

April 29-30, 1960—**Sixth Empire State Regional,** Southern Tier Host Branch, Mark Twain Hotel, Elmira, N. Y.

April 30, 1960—**Milwaukee Branch,** Annual Meeting and Banquet, Schroeder Hotel, Milwaukee, Wis.

May 3, 1960—**British Columbia Branch Meeting,** Vancouver, British Columbia.

May 4, 1960—**Seattle-Puget Sound Branch Meeting,** Seattle, Washington.

May 5, 1960—**Portland Branch Meeting,** Portland, Oregon.

May 6, 1960—**San Francisco Branch Meeting,** San Francisco, California.

May 6, 1960—**Buffalo Branch Annual Meeting,** Niagara Manor, Buffalo, N. Y.

May 7, 1960—**St. Louis Branch,** Annual Spring Banquet, Ambassador Hotel, St. Louis, Missouri.

May 7, 1960—**Toronto Branch,** Annual Regional Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada.

July 24-28, 1960—**47th AES Annual Convention,** Hotel Statler, Los Angeles, Calif.

July 24, 1960—**Executive Board Meeting,** Statler Hotel, Los Angeles, California.

September 16, 1960—**Second Metropolitan Regional Technical Session,** Newark Host Branch, Robert Treat Hotel, Newark, N. J.

September 17, 1960—**Boston Branch 24th Annual Educational Meeting and Banquet,** Hotel Statler, Boston, Mass.

February 3-4, 1961—**Third Annual Dixie Regional Technical Session,** Hotel Roanoke, Roanoke, Virginia. Blue Ridge Host Branch.

February 11, 1961—**Eighth Interim Meeting,** Supreme Society, Statler Hotel, Hartford, Connecticut. New England Regional Council, Host.

June 18-23, 1961—**48th AES Annual Convention,** Hotel Statler, Boston, Mass.

FUTURE MEETINGS

June 25-28,	**1962—49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.
June 24-27,	**1963—50th AES Annual Convention,** Ambassador Hotel, Atlantic City. N. J. Sponsorship Newark Branch.
June 15-18,	**1964—51st AES Annual Convention,** St. Louis, Missouri.
June 27-July 1,	**1965—52nd AES Annual Convention,** Statler Hotel, New York, N. Y.

INTERSOCIETY

April 20,	**1960—Society of Plastic Engineers,** North Texas Section, Regional Technical Conference, Hotel Texas, Fort Worth, Texas.
April 21-28,	**1960—American Society of Tool Engineers,** Tool Show, Detroit Artillery Armory, Detroit, Michigan.
May 1-5,	**1960—The Electrochemical Society,** Spring Meeting, LaSalle Hotel, Chicago, Ill.
May 3-5,	**1960—15th Purdue Industrial Waste Conference,** Purdue Memorial Union Building, Purdue University, Lafayette, Indiana.
May 9-13,	**1960—American Society for Metals,** 2nd Southwestern Metal Exposition and Congress, State Fair Park, Automobile Building, Dallas, Texas.
May 14,	**1960—Masters' Electro-Plating Association,** 42nd Annual Banquet, The Plaza, New York, N. Y.
June 26-July 1,	**1960—American Society for Testing Materials,** 63rd Annual Meeting (with Apparatus Exhibit), Chalfonte-Haddon Hall, Atlantic City, N. J.
July 22-24,	**1960—National Association of Metal Finishers,** 5th Annual Convention, Hotel Statler, Los Angeles, California.
July 24,	**1960—Metal Finishing Suppliers' Association,** Board of Trustees Meeting, Hotel Statler, Los Angeles, Calif.
July 25,	**1960—Metal Finishing Suppliers' Association,** Annual Luncheon and Meeting, Hotel Statler, Los Angeles, Calif.
September 26-30,	**1960—Instrument Society of America,** 15th Annual Meeting; Instrument-Automation Conference and Exhibit, Coliseum, New York, N. Y.
October 9-13,	**1960—The Electrochemical Society,** Fall Meeting, Shamrock Hotel, Houston, Texas.
October 12-14,	**1960—American Vacuum Society,** 7th National Symposium, Cleveland-Sheraton Hotel, Cleveland, Ohio.
October 17-21,	**1960—American Society for Metals,** 42nd National Metal Exposition and Congress, Trade and Convention Center, Philadelphia, Pa.

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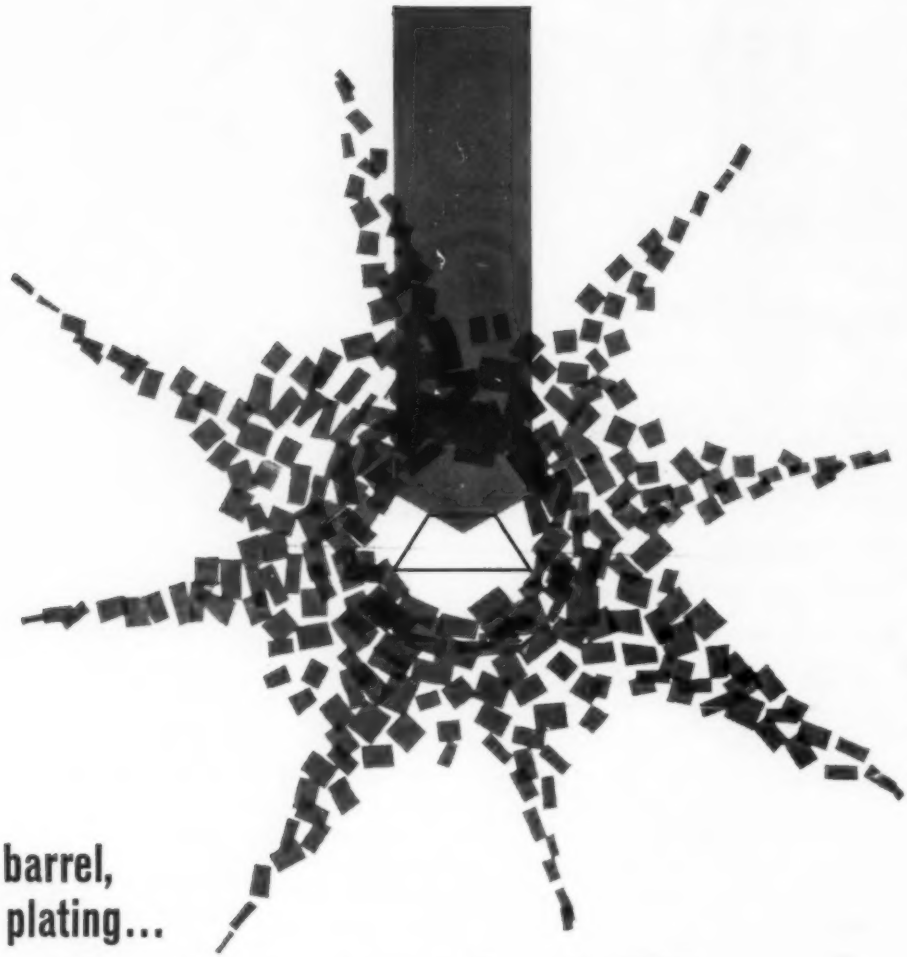

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